JUNE 1954

PRECISION METAL MOLDING

INCLUDING DIE CASTINGS MAGAZINE

DIE CASTINGS
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POWDER METALLURGY
PERMANENT MOLD CASTINGS
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JUNE 1954
Vol. 12 No. 6

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PRECISION METAL MOLDING

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Letters to the editor

CLEANING CASTINGS

I would be very grateful to you if you could let me have the names and addresses of some manufacturers producing newly developed types of machinery for Foundries. I am particularly interested in knowing which firm makes equipment for the cleaning of castings, based on jets of water being directed under high pressure on to the castings.

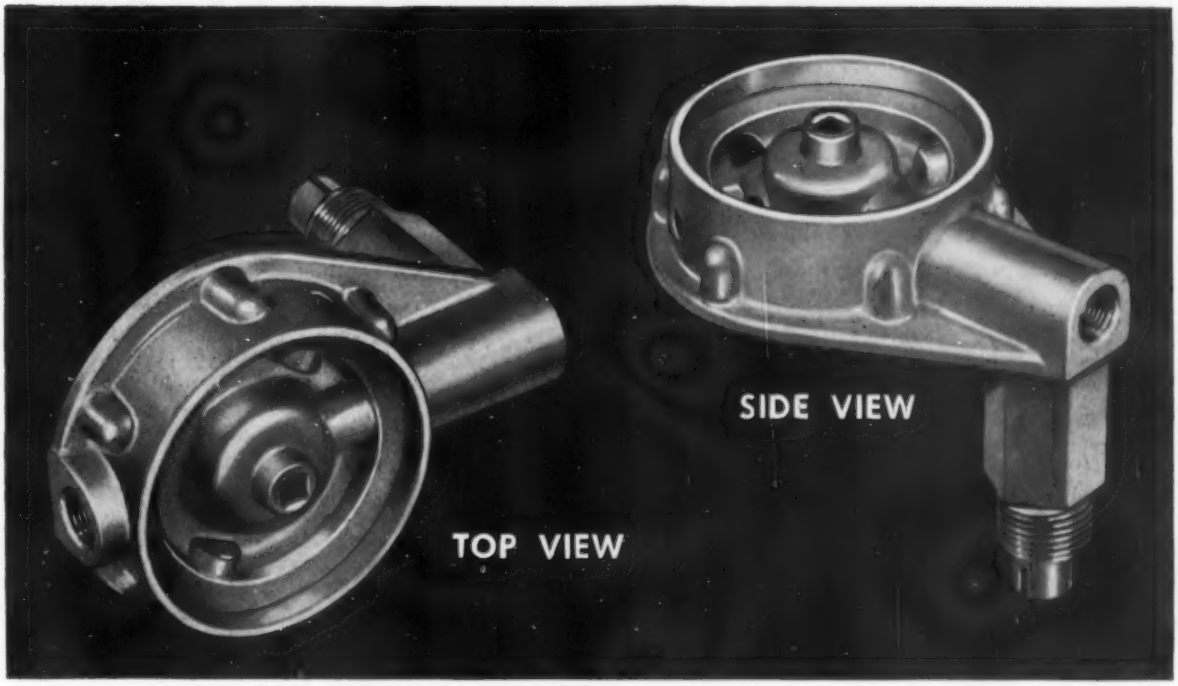
I do hope that you will be able to supply me this information. However, should that not be possible, perhaps you will be kind enough to let me know whom I could ask for it. — F. G. S.

The process to which reader F. G. S. probably refers is a method of blasting surfaces of castings or dies with very fine abrasives suspended in liquid. This liquid blasting technique, such as Pangborn Corp.'s Hydro-Finish, is widely used for cleaning and maintaining surfaces of die casting dies. A non-directional finish that does not affect dimensions is attained. This type of treatment is more recently being used to clean and condition the surface of castings. Methods using dry abrasives, combination of tumbling and abrasive blasting, and "airless" blasting are also used for cleaning castings. Names of manufacturers have been forwarded. — Ed.

WELDING DIE CASTINGS

In the April issue of your magazine in the section "Letters to the Editor", we noted that you have a more complete

continued on page 6



profitable designing with MADISON-KIPP zinc and aluminum die castings

Co-ordinated effort by the part designer and Madison-Kipp produced this Fuel Filter Body which required no machining except tapping and threading. This procedure has often proved highly profitable.

Madison-Kipp has seasoned and skilled mechanics who know that many manufacturing problems can be resolved or at least reduced on the drafting board.

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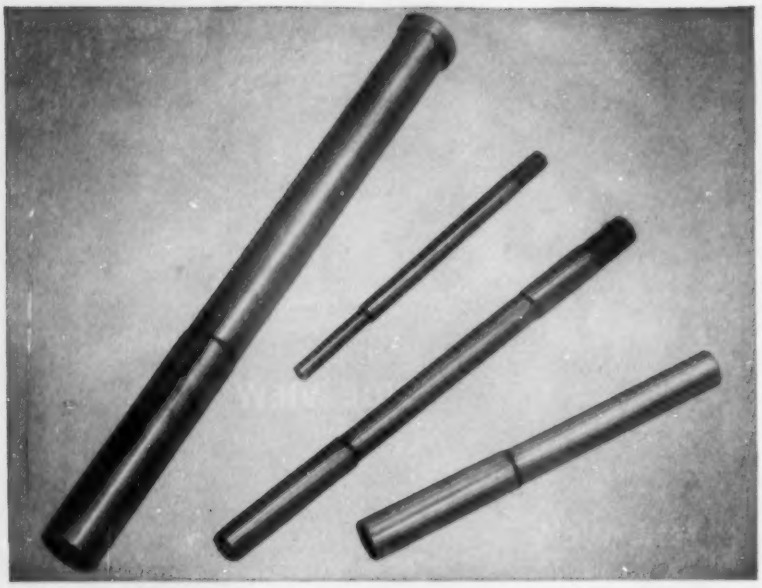

Flame-Plating
CUTS THE COST
of Holes

A hardened steel core rod, used for forming a hole in a powdered metal product, wore so rapidly on a certain operation that only 10,000 parts could be produced before the tool had to be replaced. A steel core rod, Flame-Plated with tungsten carbide, was then used for the same operation. At the last calculation 291,905 parts had been produced with *no noticeable wear* of the Flame-Plated rod—resulting in substantial savings of down time and replacement costs. When this core rod does wear undersize, the tungsten carbide coating may be easily removed and reapplied, again and again.

Flame-Plating is a new LINDE process for applying a wear-resistant coating of tungsten carbide on the wearing surfaces of parts and many tools made of most common metals. For the full story on how you can solve your wear problems with Flame-Plating, see the new "Flame-Plating" booklet. Clip coupon today for your free copy.

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Please send me your free booklet on Flame-Plating, Form 8065

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Address.....

City.....State.....

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LETTERS TO THE EDITOR
continued from page 4

summary of the welding process for die castings than was published in the January issue.

We would appreciate receiving a copy of this summary. — P. M. W. (Chief Metallurgist)

Information sent. The original article reported the successful welding of two aluminum die castings on a production basis. This month we offer another article on production welding of an aluminum die casting to sheet metal by Philco as a production line process. — Ed.

POWDER METALLURGY DIRECTORY

Kindly forward us one reprint of the third annual Powder Metallurgy Directory which was included in the April 1954 issue of Precision Metal Molding, or a copy of the magazines if reprints are unavailable. J. E. G. (Research Librarian)

Many requests for extra copies of PMM's annual directory of the powder metallurgy industry have been received. We are glad to send them out as long as our supply lasts. — Ed.

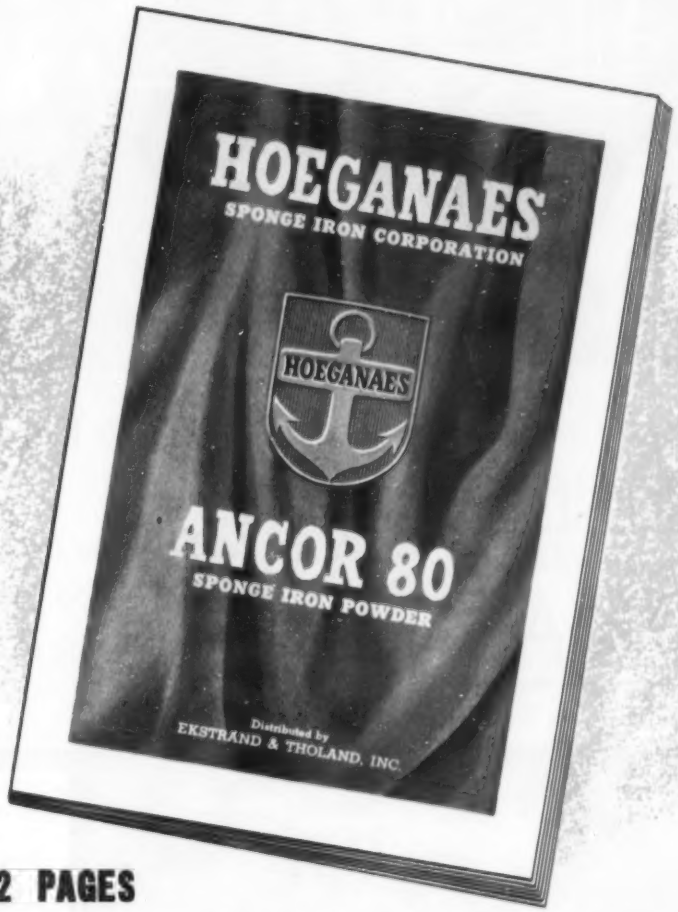
POWDERED IRON CORES

I wish to obtain one copy of the August 1953 issue of Precision Metal Molding because I understand there is an important article in this number pertaining to iron powder cores.

If a copy of this back number containing R. D. Ponemon's paper is available, will you be kind enough to either mail one to me immediately and bill me, or let me know what the cost will be? — H. E. C.

Copy forwarded. An article in last month's PMM also was devoted to the subject of electronic cores produced from iron powders. — Ed.

LATEST INFORMATION ON IRON POWDER FOR YOU!



12 PAGES

of latest engineering data on iron powders and sintered iron parts now available.

Millions of structural parts and porous bearings are sintered all over the world annually from Swedish Sponge Iron Powder. Their advantages: economy of manufacture and physical characteristics make them ideal for business machines, vacuum cleaners, washing machines automobiles and many other products. The trend towards more intricate parts and higher strength applications has led to the development of Ancor 80. Ancor 80 is superior to our present MH-100 grade in purity, green strength and sintered strength. Growth of compacts made from iron-copper mixtures during sintering is considerably less for Ancor 80 than for MH-100.

Ancor 80 powder is now being produced at our new plant in Riverton, New Jersey to give American manufacturers a primary domestic source of iron powder, and is distributed by Ekstrand & Tholand, Inc., 441 Lexington Avenue, New York City.

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Send me a free copy of the latest information on Ancor 80 iron powder.

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The Timken Company Protects $500,000 Furnace With—

FIRE-RESISTANT PYDRAUL

First tunnel-type furnace for billet heating uses 1,000 gallons of Monsanto fire-safe hydraulic fluid

50 tons of steel per hour is the capacity of this furnace. Safe Pydraul actuates 3 hydraulic operations: billet-charging machine, car separators and car lifts. Non-corrosive Pydraul can be re-used again and again, cuts oil make-up 60%.

Pydraul: Reg. U. S. Pat. Off.

Near heat or flame, ordinary hydraulic fluid is a serious hazard. Spraying from a line break, it can ignite to cause injuries, loss of production, costly equipment shutdowns.

That's why The Timken Company insisted on Pydraul in this new heat-treating furnace at Canton, Ohio, built by Swindell-Dressler.

Pydraul will not sustain flame. In tests, when sprayed into a 6000°F. oxyacetylene flame, it does not support combustion. At Timken the furnace temperature may go to 2300°F. Heat that would set ordinary fluid aflame does not ignite Pydraul.

Since industrial fires give no warning before they start, check the hydraulic fluid now used in your plant. Is it fire-resistant? If not, let us tell you about Pydraul . . . a recent price reduction makes it more than ever the most economical fire-resistant fluid in actual use. For information, call any Monsanto office.

This report, "Pydraul F-9," will be sent on request. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, Box 478, St. Louis, Missouri.

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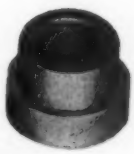
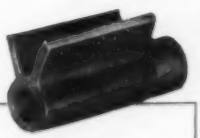
ACCUMET PRECISION INVESTMENT CASTINGS





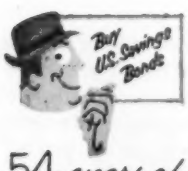
are available in all steel and high-alloy grades...

Here are some of the more popular grades used for Crucible ACCUMET precision castings
AISI 1010 — Magnetic Iron
AISI 1020 — Low Tensile
AISI 4620 — Carburizing
Mod. 4140 — Medium to High Tensile
Ketos Oil-Hardening Tool Steel
HYCC Air-Hardening Tool Steel
Rezistal 410 — Hardenable Stainless
Rezistal 303 — Free Machining Stainless
Rezistal VT — AMS 5385B High Temperature
Rexalloy — Cr-W-Co Alloy
Alnico Magnets

Whatever the grade of steel or high-alloys your specifications call for, you can get it in Crucible ACCUMET® precision castings.

And you can depend on the quality of ACCUMET castings, for they are made by the Country's leading specialty steel producer . . . to long established steelmaker's melting standards, in modern electric furnaces. The composition of ACCUMET is carefully controlled by chemical analysis of the *casting* — not merely of the remelt stock charged into the furnace. This extra control of analysis means better uniformity in response to heat treatment, hardenability and performance.

Put an end to costly machining of parts. Let your Crucible representative show you how ACCUMET precision investment castings can save you time and money.



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CRUCIBLE first name in special purpose steels

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Names and Trends in Markets · Materials · Applications

FACILITIES for producing powdered metal parts have just been announced by a major Eastern commercial die casting firm, although the company has actually been in production on powdered metal parts in a wide range of metals for several years. Parker White Metal Company of Erie, Pa., has made public its powder metallurgy division, which will complement its large die casting operation.

SOME OF THEIR BEST work has been submitted by die casters to be included in a new film being produced by the American Zinc Institute. An industry committee recently reviewed hundreds of impressive die castings in zinc, aluminum, magnesium and brass to select those to be filmed. The movie will be widely circulated, and the scenario indicates that designers and engineers throughout industry will find it very informative.

HIGH TEMPERATURE DIE materials? A hint in the direction that may lead to die casting dies that will withstand brass, or possibly iron casting temperatures is contained in a paper recently presented by John Wulff, M. I. T. metallurgy professor, before the Electrochemical Society. Prof. Wulff's paper reported experimental work on the fabrication of massive materials from layers of wire, ribbon or sheets of refractory metals bonded together with a powder.

NEWEST PRODUCER of castings from frozen mercury patterns by the Mercast process is Industrial Metal Castings Co. of Cleveland, whose entry into the field was announced this month.

A QUESTIONNAIRE currently being circulated among its members by the Metal Powder Association concerns preferences in terms to be used in describing products of powder metallurgy. It will be recalled that at the request of MPA, the term "sinterings" was replaced with the older phrase "powdered metal parts" in PMM pending a decision of the industry concerning the most suitable and appropriate nomenclature. The questionnaire offers 20 alternate words or phrases. June 14 is the date set for counting ballots.

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Specialists in Zinc Die Casting

● These intricate zinc die castings produced by Schultz represent the combined efforts of a team of skilled specialists. Product features: dimensional accuracy, stability, non-porous structure, flawless finish and low cost. No piece leaves our plant until it has passed a rigid inspection — unusual in its extensiveness even in the highly critical standards of our industry. Our facilities for inspection, assembly and packing are designed on a production line basis to produce a continuous flow of finished castings for prompt delivery.

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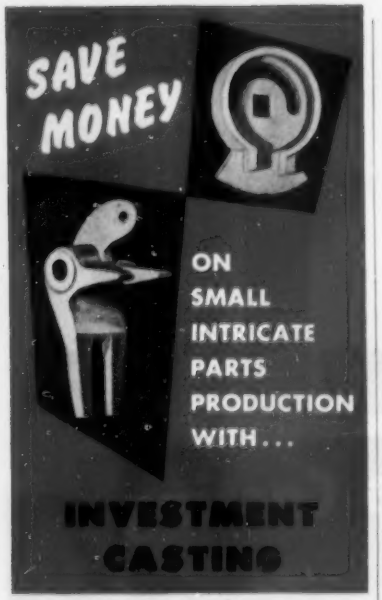

You'll eliminate costly machining operations and cut tooling and production costs with Investment Casting. This process is the economical way to –

- Cast intricate, undercut parts to critical dimensions and finishes.
- Cast parts where limited volume or high temperature of metal does not permit use of die-casting.
- Cast parts with shapes too intricate to forge.
- Cast metals that are too hard for economical machining or finishing.

We are in a position to offer you assistance in planning your own investment casting department – or, we will gladly recommend casting firms that can handle the operation for you. This service will not obligate you in any way.

WRITE TODAY FOR THE INVESTMENT CASTING STORY

This free 12-page booklet – "MODERN PRECISION INVESTMENT CASTING" – contains complete information on the Investment Casting Process.

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Between the Lines of this and future issues

Don't Hide That Face . . .

Call it egotism or showmanship, but the fact remains that public speakers and performers want the audience to see as much of their faces as possible. Sometimes we wonder why. Anyway, with the advent of TV and improved public address systems, there has been a demand for smaller microphones to obscure as little of the speaker's face as possible, while improving the instrument's performance. Two PMM processes have been utilized to help in designing smaller, better microphones. The article starts on page 44.

Quiet! Blower at Work . . .

Nothing is quite as annoying as the constant rattle of a sheet metal housing that has begun to vibrate loose on some piece of household equipment. A manufacturer of blowers for domestic oil burners gets around this problem by housing his blowers in a pair of rigid zinc die castings. There is nothing to get loose and rattle. Read about it on page 51.

New Style in Auto Engine Blocks . . .

What may become the "new look" in automotive engine blocks will soon be reported in PMM. A built-up structure of accurately dimensioned aluminum permanent mold castings brazed together into a block may be tomorrow's answer to the problems encountered in sand cast iron blocks.

The Shapes of Lead . . .

Lead is a soft, dense metal that can be formed in many ways. If high accuracy is needed, permanent mold casting or die casting can be considered. Some typical uses for lead in these forms are illustrated on page 46.

Paint It Faster . . .

Some of the methods for spray painting die castings faster with mechanized equipment are discussed in this issue. Masking off areas and two-tone painting come in for special reference. The article begins on page 67.

"from qwertyuiop to zxc vbnm,./- DIE CASTING helps me type faster, better and longer"...

CASE HISTORIES FROM MT. VERNON FILES

The new Smith-Corona "Eighty-Eight" is really a beauty. "Designed and built to out-perform any office typewriter ever made" is what its makers say about it.

And this is what they also have to say about the Mt. Vernon die casting shown below, which forms an essential part of the "Eighty-Eight.":

"This particular casting was designed for maximum torsional, compressive, and tensile strength. In an analogy of the automobile industry, this casting might be called the 'engine mounting' of a typewriter; the engine of the typewriter being the typebar segment. Because of the high strength characteristics needed for an 'engine mounting', we selected die cast aluminum. Other reasons for selecting die casting are its high degree of accuracy in contour and the lower cost of machining processes."

Whatever your product, whether simple or intricate, consult with us. We have up-to-the-minute facilities for die casting aluminum and zinc, and a vast reservoir of experience in die making. It's highly possible that we can help you, as we helped Smith-Corona, to lower unit costs . . . show you the way to improved products, too.

MT. VERNON
DIE CASTING CORP.
STAMFORD, CONNECTICUT

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the seven grades of die slick

Here is brief information on the seven different grades of Die Slick—more detailed information will be sent on request.

3 — *Aids parting and ejection on difficult ALUMINUM and MAGNESIUM castings. Non-staining. Enables better metal flow and fill-out of castings.*

4 — *Expressly for BRASS castings—sometimes used on aluminum and magnesium. Extra heavy-duty compound with lubricating graphite. Retains lubricity under high heat.*

9 — *For clean "hardware" finish ZINC castings, where finest plating results are required. Assures maintenance of clean cavities, cores, ejector pins, and guide pins.*

11 — *General purpose compound for ZINC castings. Generally stain-free unless applied too heavily. Prevents sticking and scoring.*

SG — *Standard grade compound for general use on ALL alloys except brass. A high viscosity amber fluid that is not readily burned off by the heat of the dies.*

PS — *Plunger-Slick is an adherent viscous compound that will not melt under highest casting temperatures. Expressly for cold chamber machines, it prevents scoring, sticking, or wear on plunger parts. No. 21—(silver) for average use on all alloys. No. 34—(black) has added micronized graphite for extra high lubricity.*

Specify the grade you wish to try—and the alloy on which you will use it. If you're not fully satisfied, simply return the unpaid invoice.

Cordially,

V. W. Smith

V. W. Smith

. . but look at the casting, Boss . . . not a scratch!

Yes, Homer—getting the castings out without a scratch *is* important, but when the methods you use damage or endanger expensive dies, it's awfully hard to keep operating at a profit.

And that is one of the many very good reasons why more than 80% of all die casters use Die Slick Compounds. Die Slick aids in keeping dies clean—never attacks die surfaces—will not build up carbon or gum deposits—and lengthens die life.

For real die protection, break in new sets with Die Slick, and keep all sets in top condition longer by using the proper grade of Die Slick consistently. There are seven distinct grades of Die Slick (see adjacent column) to cover every die casting requirement. We'll gladly send a liberal supply of any grade Die Slick for tryout under your production conditions.

DIE SLICK®

used by die casters everywhere

G. W. SMITH & SONS, INC. 5403 Kemp Road, Dayton 3, Ohio

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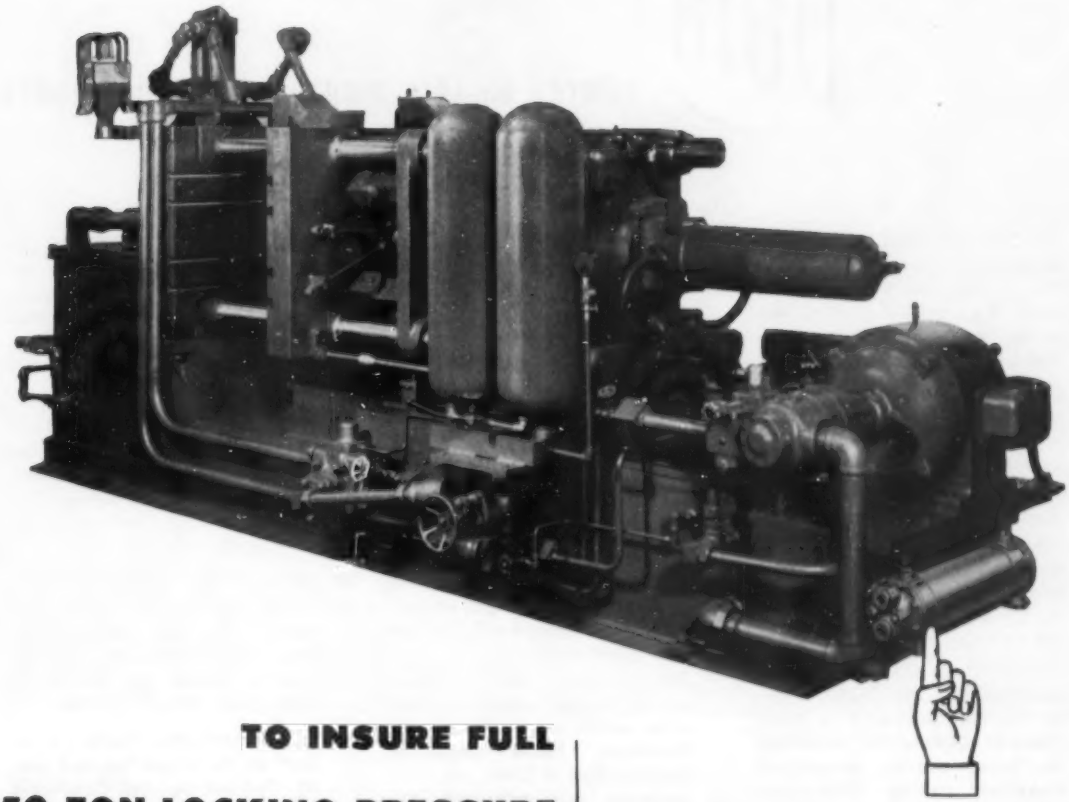
KEEPS HYDRAULIC OIL properly cooled



TO INSURE FULL 450-TON LOCKING PRESSURE OF THIS B-T DIE CASTING MACHINE

ROSS EXCHANGER

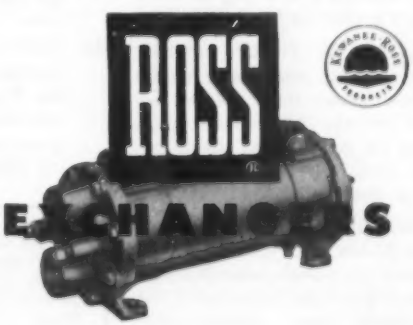
Cycling 700 shots per hour, this B-T Die Casting Machine has been designed to exert a 450-ton locking pressure. To maintain rated capacity . . . *to prevent pump slippage from overheated, thinned oil,* a Ross Type BCF Exchanger has been installed. Oil temperature is kept within recommended limits.

Ross Exchangers are standard equipment on all B-T Die Casting Machines. "We have found them to be the most efficient type of cooler we have been able to obtain," states B & T Engineering and Sales Co.

Pre-engineered and fully standardized, Ross Type BCF Exchangers are regularly preferred for numerous other types and makes of hydraulic machinery. Unsurpassed in thermal efficiency and ruggedness, these compact, all-copper and copper alloy units are available with "off-the-shelf" promptness to meet most requirements.

Detailed information is in Bulletin 1.1K5. Write for your copy.

KEWANEE-ROSS CORPORATION
DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
1446 WEST AVENUE • BUFFALO 13, N. Y.
In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.



Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

For additional information Circle No. 39 on the Reader Service Card

Reference Data offered in this month's advertisements

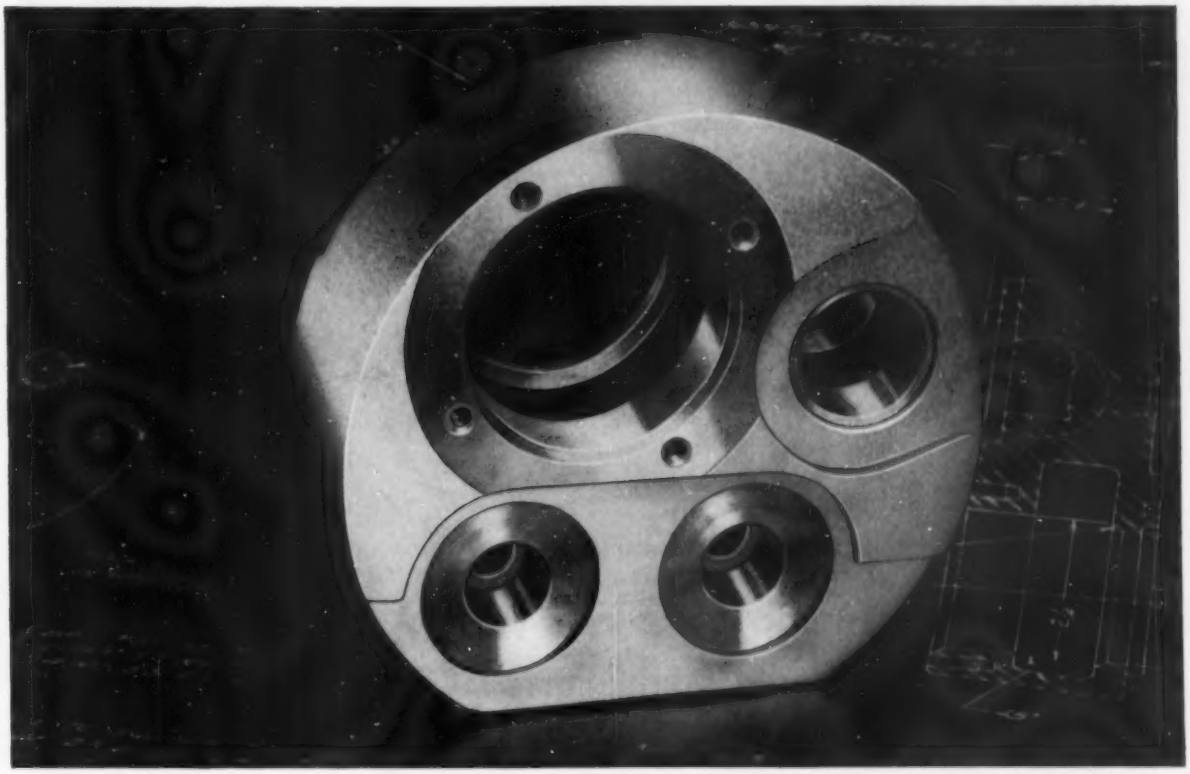
1. DIE CASTING MACHINES. In a bulletin offered by the A. B. C. Die Casting Machine Co., the small high speed casting machines made by the company are fully described.
2. DIE LUBRICANT. Reprint DC and Bulletin 426-30L from Acheson Colloids Co. give a graphic comparison of standard lubricants and colloidal graphite.
6. INDUCTION MELTING FURNACES. Ajax Engineering Corp. has available technical data and application information on induction furnaces for use in melting zinc and aluminum die casting alloys.
7. MERCASTING PROCESS. Bulletin No. 706, published by Alloy Precision Casting Co. describes the frozen mercury process of investment casting. Differences between this process and the conventional investment casting process are clearly brought out.
9. PERMANENT MOLD CASTINGS. The Aluminum Permanent Mold Co. has a brochure which fully describes the permanent mold process and gives the advantages and uses of these castings. Case histories are cited.
10. CASTABLE ALUMINUM ALLOYS. The chemistry and the basic physical properties of aluminum and zinc alloys are given in a technical brochure published by the Aluminum Smelting & Refining Co. and Certified Alloys Co.
16. SPECIALIZED PISTON RINGS. Die casting machines require special piston rings tailored for that service. Auto Diesel Piston Ring Co. has catalog sheets listing sizes, types, prices, etc. of these specials.
18. POWDERED METAL PRESSES. A new 50-ton press specifically designed for powder metallurgical uses is described in Bulletin 3104 available from Baldwin-Lima-Hamilton.
19. INVESTMENT CASTING ALLOYS. The alloys available together with their chemistry, physical properties and form are all given in a brochure from Cannon-Muskegon.
23. NONFLAMMABLE FLUIDS. The applications and advantages of nonflammable hydraulic fluids are discussed in a booklet, UCON Hydrolubes, F-7380 published by Union Carbide & Carbon Corp.
27. METAL POWDERS. Low oxide, high purity nonferrous metal powders are described in technical data sheets available from The Glidden Co.
31. DIE CASTING ALLOY. News about zinc die casting alloy and other metals are in the Henning Messinger, house organ of Henning Bros. & Smith, Inc.
32. SPONGE IRON POWDER. The properties of Ancor 80 powder and of the compacts made from it are given in a technical report issued by the Hoeganaes Sponge Iron Corp.
41. BATCH MELTING FURNACES. For melting small amounts of metal in research and small lot production, Detroit Electric Furnace Div. has information on their Type PT 15 lb. indirect arc furnace.
42. DIE CASTING MACHINES. The Kux Machine Co. has available catalogs, booklets, and reports on die casting machines in various types and sizes.
43. SURFACE HARDENED PINS. A booklet, Form 8065, from Linde Air Products Co. describes the advantages, applications and gives case histories of hardening core pins by flame plating.

To get copies of any item listed here, simply circle the appropriate number on the Reader Service Card bound into this issue.

44. DESIGNING DIE CASTINGS. An authoritative report on the design of aluminum and magnesium die castings and examples of many sound uses of these castings are contained in reports from Litemetal Dicast, Inc.
45. MELTING FURNACES. Two-chamber melting furnaces to give cleaner, better alloyed metal are described in bulletin 560 available from Lindberg Engineering Co.
48. PRE-ALLOYED METAL POWDERS. Both pure metals and pre-alloyed metal powders are discussed in literature and engineering reports that are available from Metal Hydrides, Inc.
51. NONFLAMMABLE FLUID. A report on the properties and uses of Pydraul, a non-flammable hydraulic fluid can be secured from Monsanto Chemical Co.
52. INVESTMENT BONDING AGENT. The uses of ethyl silicate as a bonding agent for silica in investment casting is fully described in a technical report from Monsanto Chemical Ltd.
55. SELF LUBRICATED BUSHINGS. Costs can be cut by using stock sizes of self lubricating bushings. National Molded Products, Inc. has a complete listing for distribution.
57. MOLDED BRASS POWDER. The advantages of using brass powder for making structural parts and the properties of sintered brass compacts are given in a new book published by The New Jersey Zinc Co.
61. DIE CASTING MACHINES. Literature describing the complete line of English-made die casting machines can be secured from Projectile & Engineering Co., Ltd.

continued on page 18

Only *MERCASTING** can make this as a unit!



*FROZEN MERCURY INVESTMENT CASTING

PROBLEM:

Three expensive machined parts were formerly required to get the necessary internal cavities for this valve body. Use on an electronic tube evacuator made special tolerances necessary. After assembly by welding, re-machining, and testing, a large part of the total production was rejected for failure to meet the rigid specifications of the manufacturer—Consolidated Vacuum Corp., well-known producer of high-vacuum equipment.

SOLUTION:

Consolidated Vacuum Corporation brought the problem to Alloy Precision Castings Company. Cooperating Alloy foundry engineers and metallurgists developed the pictured one-piece, 5½-lb. mercasting of 303 stainless. The "as-cast" piece can be held to an average plus or minus .003 inch per inch on certain critical dimensions. A comparatively small amount of finish machining is needed on valve seats and tapped holes. A-6296A

SUMMARY:

The illustrated mercasting is a better valve body easily produced in a more desirable material. Tremendous savings are effected through elimination or drastic reduction of special tooling, machining, waste material, and scrapped production.

Send prints of your problem parts today. Learn how Alloy Precision can save you time and money.

ALLOY PRECISION CASTINGS COMPANY, DEPT. 61
45th and Hamilton, Cleveland 14, Ohio

Please RUSH Bulletin 706 describing the Mercasting Process.

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____

ZONE _____ STATE _____

ALLOY PRECISION *Castings Company*

EAST 45th ST AND HAMILTON AVE • CLEVELAND 14, OHIO

For additional information Circle No. 7 on the Reader Service Card

TWO machined parts $1.00

TEN Powdermet* PARTS .... $1.00 (10¢ each)

Don't cut parts—*Cut Costs* with YALE Powdered Metal Parts

Yes, powder metallurgy has an important price story—because when you save the extensive and costly operations involved in machining, it shows up in *more parts* and lower production costs!

But at Yale & Towne, there's another story of *equal* importance ...*complete* engineering service, the kind you can trust—from consultation through production and delivery of parts that are *really* right!

Engineering service has given Yale & Towne its position of leadership in powder metallurgy. We are careful to *recommend only applications where Powdermet* parts will perform successfully.* Then, in design and production of these parts, Yale & Towne offers the experience, know-how, modern facilities and creative ingenuity that *assure* best results.

As a part of this complete engineering service, Yale & Towne maintains a continuous special training program for well-qualified engineers. These men become Powdermet* consultants—available to discuss the advantages and limitations of Powdermet* parts *right in your own plant.* They will show you how Powdermet* may cut your production costs and improve your product. And there is *no obligation* for this engineering counsel.

TAKE ADVANTAGE of Yale & Towne's skilled engineering assistance on your powdered metal problems.

Arrange for a visit by a Yale & Towne consultant —today!

The world's most famous key
. . . symbol of industrial leadership!

YALE & TOWNE
MANUFACTURING COMPANY
PMP *Powdered Metal Products Division*
9335 Belmont Avenue, Franklin Park, Illinois

Send Today for Free Informative Booklet on Powdered Metals

The Yale & Towne Manufacturing Company
Powdered Metal Products Division
9335 West Belmont Avenue
Franklin Park, Illinois

☐ Send Booklet ☐ Send information on Powdermet* parts for attached specifications or drawings.
☐ Have a Yale & Towne Powdermet* engineer call on me.

Name.....Title.....
Company.....
Street Address.....
City.....Zone.....State.....

*TRADE-MARK

For additional information Circle No. 73 on the Reader Service Card

REFERENCE DATA
continued from page 16

62. DIE CASTINGS. Racine Die Casting Co. has a brochure that tells what can be done with die castings. Also given is a description of their facilities to design and produce castings to specifications.

64. MODERN INVESTMENT CASTING. "The Investment Casting Story" is the title of a booklet that has been prepared by Alexander Saunders & Co.

67. WAX MELTERS. A complete description, and examples of application of wax melters for the investment casting industry are given in literature from Sta-Warm Electric Co.

69. STAINLESS LADLES. Spincraft, Inc. has available a complete catalog of the stainless steel ladles they can supply.

70. REVERBERATORY FURNACES. The Stroman Furnace Co. has catalog sheets available describing their standard and special reverberatory furnaces for wide range of capacities and uses.

71. PLASTER MOLD CASTINGS. A booklet describing the plaster mold casting process and its applications in industry is available from the Universal Casting Corp.

73. POWDER METAL PARTS. The Powdered Metal Products Div. of Yale & Towne Mfg. Co. has prepared a booklet on the powder metal process and the applications of powder metallurgy to industrial design and production.

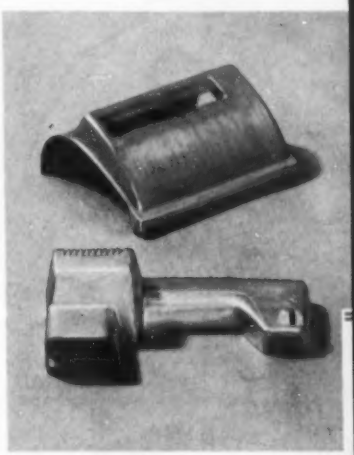
74. METAL PROTECTION. Data sheets on the properties and applications of Iridite finished surfaces are available from Allied Research Products, Inc.

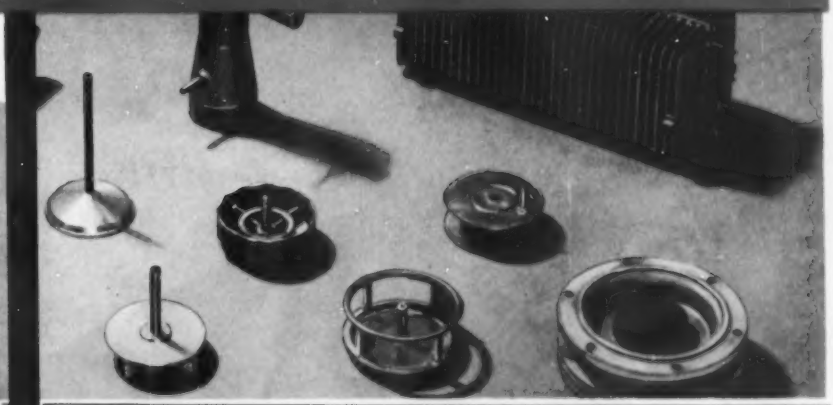
78. AUTOMATION ON DRILL PRESSES. The Bellows Co. has available Bulletins DF-110 and T-85 giving case histories of the application of air powered units on drill presses.

continued on page 94

No Problem's Too Tough

when you call in ... PRECISION





WHAT'S YOUR PROBLEM?

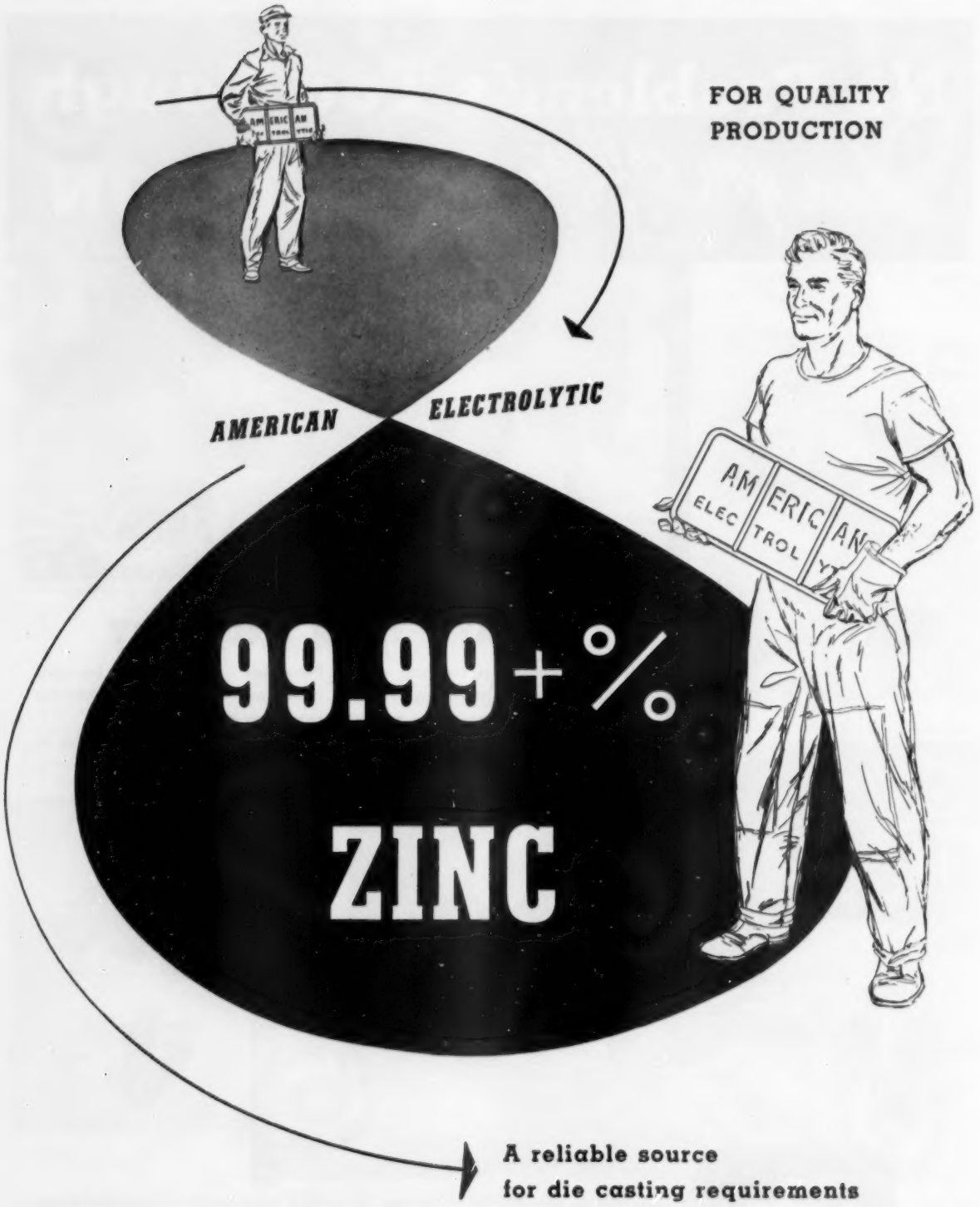
If your problem is reducing costs, reducing weight, improving product appearance or improving product performance, Precision Die Castings can solve your problems.

Remember — Precision can be most valuable when called in when the product is in design stage.
A Precision Engineer is available to you NOW!

Since 1909 the name "PRECISION" has been the symbol of highest quality in the die casting industry.

PRECISION CASTINGS CO., Inc.
212 Walnut St., Fayetteville, N. Y.
Syracuse, N. Y. · Cleveland, O. · Chicago, Ill.
Kalamazoo, Mich. · Cortland, N. Y.
British Affiliation — Wolverhampton Die Casting Co. Wolverhampton, England

For additional information Circle No. 60 on the Reader Service Card



AMERICAN ZINC SALES COMPANY

Distributors for

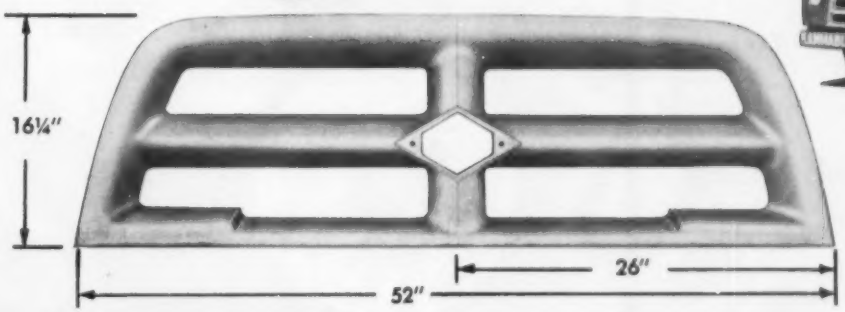
American Zinc, Lead & Smelting Company

Columbus, Ohio • Chicago • St. Louis • New York

For additional information Circle No. 14 on the Reader Service Card

ACME *Engineered* ALUMINUM & MAGNESIUM CASTINGS

An aluminum permanent mold grille casting engineered and manufactured for the Diamond T Motor Car Company.



A typical Acme casting for a defense product. Fin sections have a wall thickness of 3/16".

Consulting with Acme engineers may save you many headaches and dollars on production jobs.

We welcome your requests for this service.

Acme aluminum and magnesium castings are engineered to meet the most exacting requirements for defense or civilian product applications. Whether you manufacture trucks, home appliances, vending machines, business machines or some other type of fabricated metal product requiring light metal castings, Acme can supply your needs. We also offer aluminum and magnesium heat treated and aged castings to meet military specifications.

This all adds up to a *complete casting service,* including aluminum alloy permanent mold and semi-permanent mold castings and aluminum and magnesium alloy sand castings. This complete casting service backed by 33 years of engineering and foundry experience provides you with your best source for top quality light metal castings.

PHONE **PROSPECT 6-5035**

ACME ALUMINUM FOUNDRY CO.

6841 SOUTH BELL AVENUE • CHICAGO 36, ILLINOIS

For additional information Circle No. 4 on the Reader Service Card

ATTENTION!

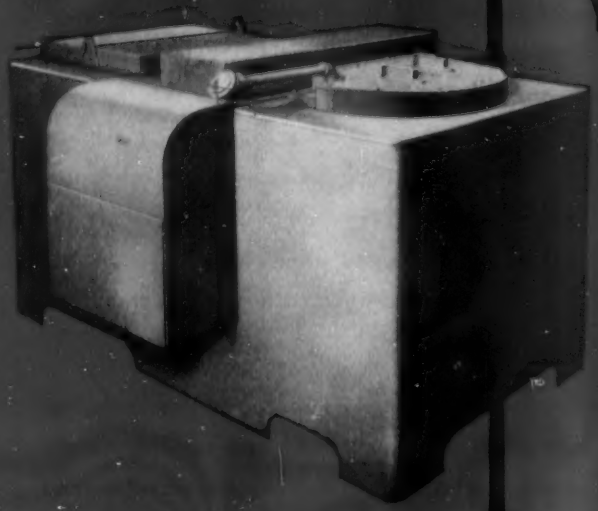
Producers of non-ferrous

..die castings

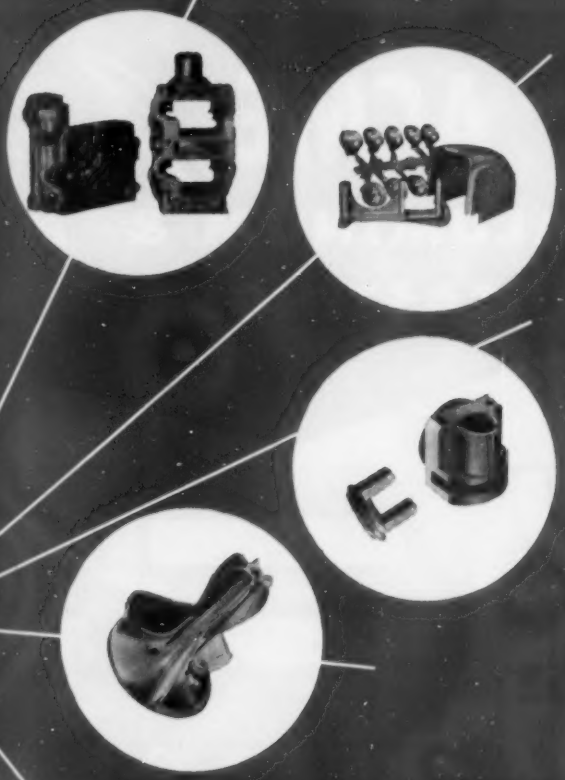
..permanent mold castings

..sand castings

..centrifugal castings



For additional information ask for bulletin 560.



You'll get even better castings if you melt with a

LINDBERG-Fisher 2-CHAMBER MELTING FURNACE

You'll increase production. You'll reduce rejects. You'll improve working conditions. The famous Lindberg-Fisher 2-chamber construction does the trick.

Two-chamber construction gives you cleaner molten metal. Residue and impurities remain in the charging chamber . . and only the clean, residue-free metal passes to the ladling chamber.

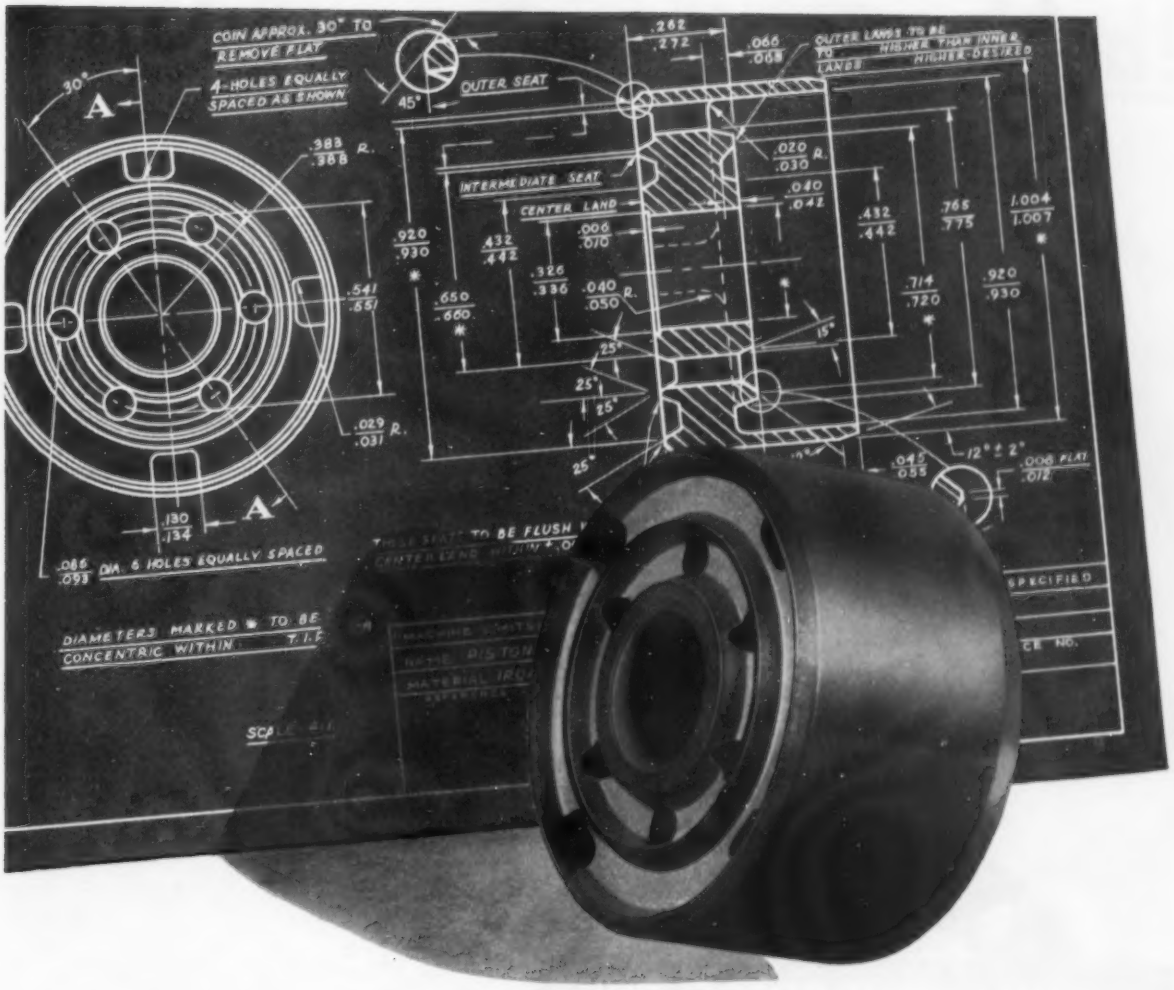
Two-chamber construction permits continuous ladling. Cold metal can be added to the charging chamber without affecting temperature of ladling chamber within operating limits of the furnace.

Two-chamber construction permits cooler operation. Induction heating heats only the metal, not the entire furnace. There are no flames—no products of combustion. Only a comparatively small area of molten metal is exposed to operator.

LINDBERG-Fisher MELTING FURNACES

A Division of Lindberg Engineering Company • 2450 West Hubbard Street • Chicago 12, Illinois

For additional information Circle No. 41 on the Reader Service Card.



MORAINE MAKES MANY COMPLEX PARTS IN ONE OPERATION

A design can be so complex that the cost of making it by conventional casting and machining methods would be prohibitive. Yet, that same design can be produced by the Moraine metal powder process at moderate cost—usually in one press operation—with no drop-off in quality or precision.

For example, this part, of intricate design and close tolerances, is made in quantity every day at Moraine with very noticeable savings to the customer. It illustrates how much can be done to improve performance and cut costs when customer and Moraine cooperate to adapt part to process.

Moraine's experience with powder metallurgy is extensive and the possibilities it offers to modern industry are almost limitless. There are very few design ideas that cannot be profitably converted into practical parts by the Moraine metal powder process.

moraine products
DIVISION OF GENERAL MOTORS CORPORATION, DAYTON, OHIO

METAL POWDER PARTS

Available From AS&R's Corpus Christi Plant
Most Modern In The Industry

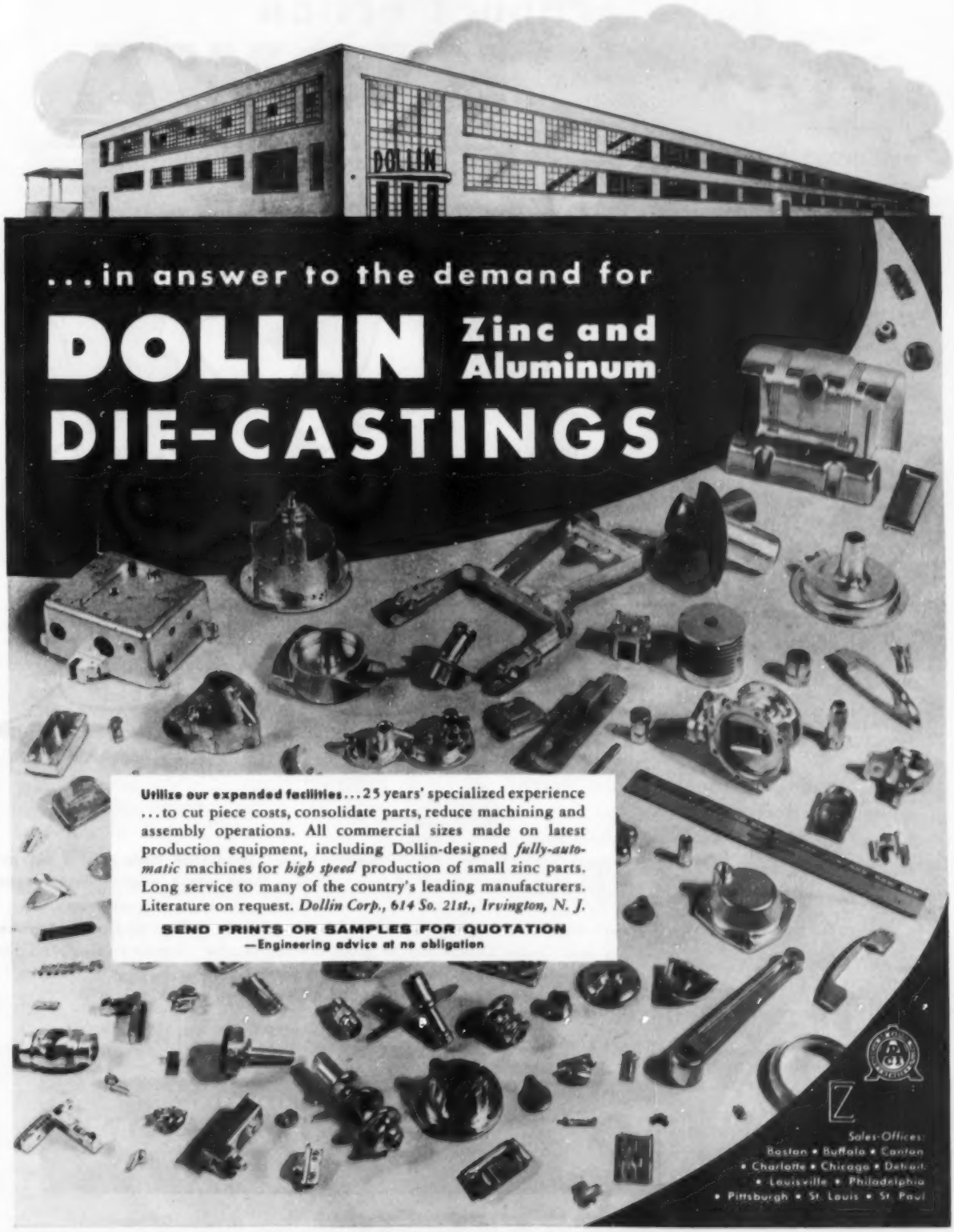
American Smelting and Refining Company

MAIN SALES OFFICE: 120 BROADWAY, NEW YORK 5, NEW YORK

PRODUCERS OF: COPPER • ZINC • LEAD • ANTIMONY • ARSENIC • BISMUTH
GOLD • SILVER • PLATINUM • CADMIUM • INDIUM • TELLURIUM • SELENIUM

For additional information Circle No. 13 on the Reader Service Card

Now! Plant Capacity Doubled!


DOLLIN
...in answer to the demand for
DOLLIN Zinc and Aluminum
DIE-CASTINGS
Utilize our expanded facilities... 25 years' specialized experience ...to cut piece costs, consolidate parts, reduce machining and assembly operations. All commercial sizes made on latest production equipment, including Dollin-designed *fully-automatic* machines for *high speed* production of small zinc parts. Long service to many of the country's leading manufacturers. Literature on request. *Dollin Corp., 614 So. 21st., Irvington, N. J.*
SEND PRINTS OR SAMPLES FOR QUOTATION
—Engineering advice at no obligation
Sales-Offices:
Boston • Buffalo • Canton
• Charlotte • Chicago • Detroit
• Louisville • Philadelphia
• Pittsburgh • St. Louis • St. Paul

For additional information Circle No. 25 on the Reader Service Card

here's your "Magic Carpet" to better

PRODUCT DESIGN

KIOWA

PRECISION FROM PRINT TO PRODUCT

- Aluminum and Zinc Base Die Castings
- Aluminum Gravity Die Castings

The Midwest's Market Place
For Non-Ferrous Castings

In today's highly competitive industrial picture, production costs play a big part in determining the success of your product. That's where product design comes in . . . predetermining production flaws and keeping costs at a minimum.
Manufacturers throughout the midwest have used the services of Kiowa's Engineering and Design Department to great advantage. For "economy-sakes", it's time you considered putting this service to work for you.
Make sure of your original design! Call on Kiowa . . . today!

OVER A QUARTER CENTURY IN CASTINGS

KIOWA CORPORATION

For additional information Circle No. 40 on the Reader Service Card

Changes in personnel

Henry S. Wingate has been elected president and **F. M. A. Noblet** treasurer of *The International Nickel Co. of Canada, Ltd.*

William F. Sauers is now associated with *Jerome J. Theopany*. Among others the company is sales representative for *Mt. Vernon Die Casting Corp.* and *Gries Reproducer Corp.*

James Wallace Jones has been appointed district representative for *Cooper Alloy Foundry Co.* Jones will service the Tennessee, Alabama, Georgia, Mississippi and Florida territory.

O. A. Stocker has joined the sales department of the electroplating division of *United Chromium, Inc.*

Miguel Romero has received a second, one year appointment under the Camille and Henry Dreyfus Foundation Fellowship at *Harvard University*.

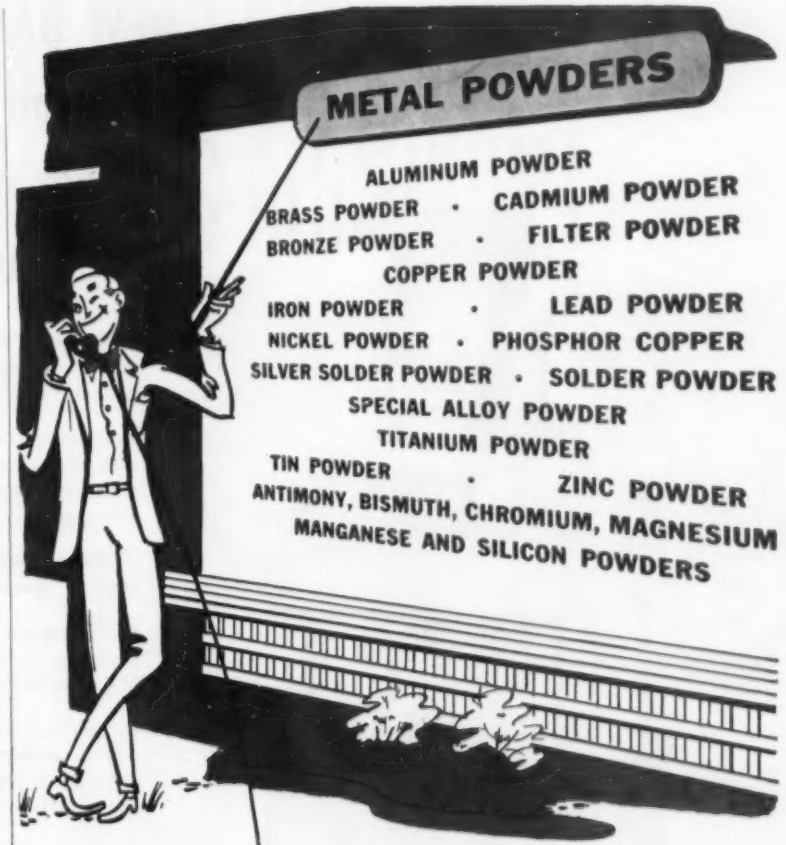
Robert A. Foley has joined *Lindberg Engineering Co.* as salesman in the Chicago District office.

R. R. Jenner has been appointed to the newly created post of director of airborne products for *Micro Switch Div. of Minneapolis-Honeywell Regulator Co.*

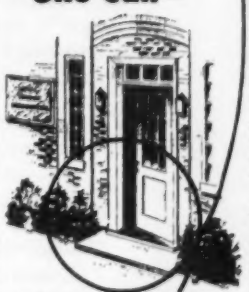
Lawrence E. Moore has been elected secretary-treasurer of the *Colonial Steel Div. of Vanadium-Alloy Steel Co.*

Howard A. Acheson, Jr. has joined the staff of *Acheson Industries, Inc.* as executive vice president.

continued on page 30



One Call—



Does It All!

Regardless of the kind or type of Metal Powder you require, a single call to Metal Powder Headquarters brings an answer to your Powder Metallurgy problem and the powder to meet your individual requirements.

This one-stop service and availability is yours by reason of MD's long metal powder research and development dating back to 1916. Today, MD is the *only* metal powder manufacturer making a complete line of metal powders.

METALS DISINTEGRATING COMPANY, INC.
Elizabeth B • New Jersey

MD PRODUCTS
METAL POWDERS
METAL PIGMENTS
METAL ABRASIVES
Since 1916

Plants:
Elizabeth, N. J.; Manchester, N. H.; Berkeley, Calif.; Emeryville, Calif.

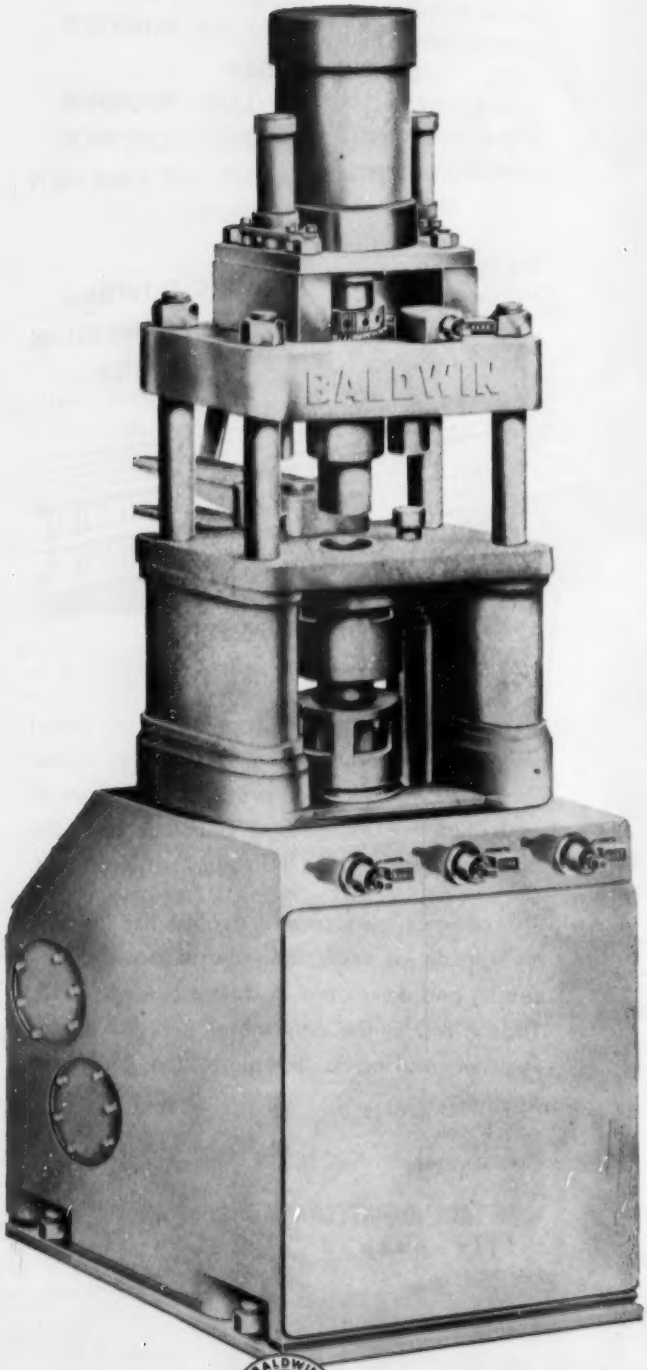
SUBSIDIARY OF AMERICAN-MARIETTA COMPANY

WORLD'S LARGEST MANUFACTURER OF FINELY DIVIDED METALS

For additional information Circle No. 49 on the Reader Service Card

NEW BALDWIN MODEL "L"

50-ton powdered metal press offers you 8 exclusive features:



1. **Hydraulic Head** prevents overloading and prolongs the life of tools and press by controlling accurately the applied pressure.

2. **Floating Die Holder** and core rod float independently of each other against pneumatic cushions. The distance of movement is controlled by positive adjustable stops.

3. **Fill Adjustment.** Two separate controls adjust the depth of fill and stroke of the bottom punch.

4. **Pre-Pressing Die Position Control** maintains flange thickness, obtains uniform density and eliminates weld line when section changes.

5. **Shuttle Type Feeder,** air operated and cam controlled, carries the same volume of material over the die cavity each time. Spring loaded cutoff ring prevents loss of material.

6. **Automatic Lubrication.** All moving lubricated parts are completely enclosed and sealed so that abrasive material can not get into the bearings. All bearings subject to load are pressure lubricated. The press will not operate if there is no oil pressure in the lubricating system.

7. **Variable Cycling** with five options, as follows:
   - Continuous run.
   - Semi-continuous run with dwell—stop at any predetermined point—dwell—start automatically. Dwell time is adjustable.
   - Single stroke—stop at any predetermined point—restart when operator pushes start button.
   - Single stroke with dwell—combination of two preceding steps.
   - Inching.

8. **Quick, Accurate Adjustment** permits changes in density or weight *while the press is in operation.*

WRITE!

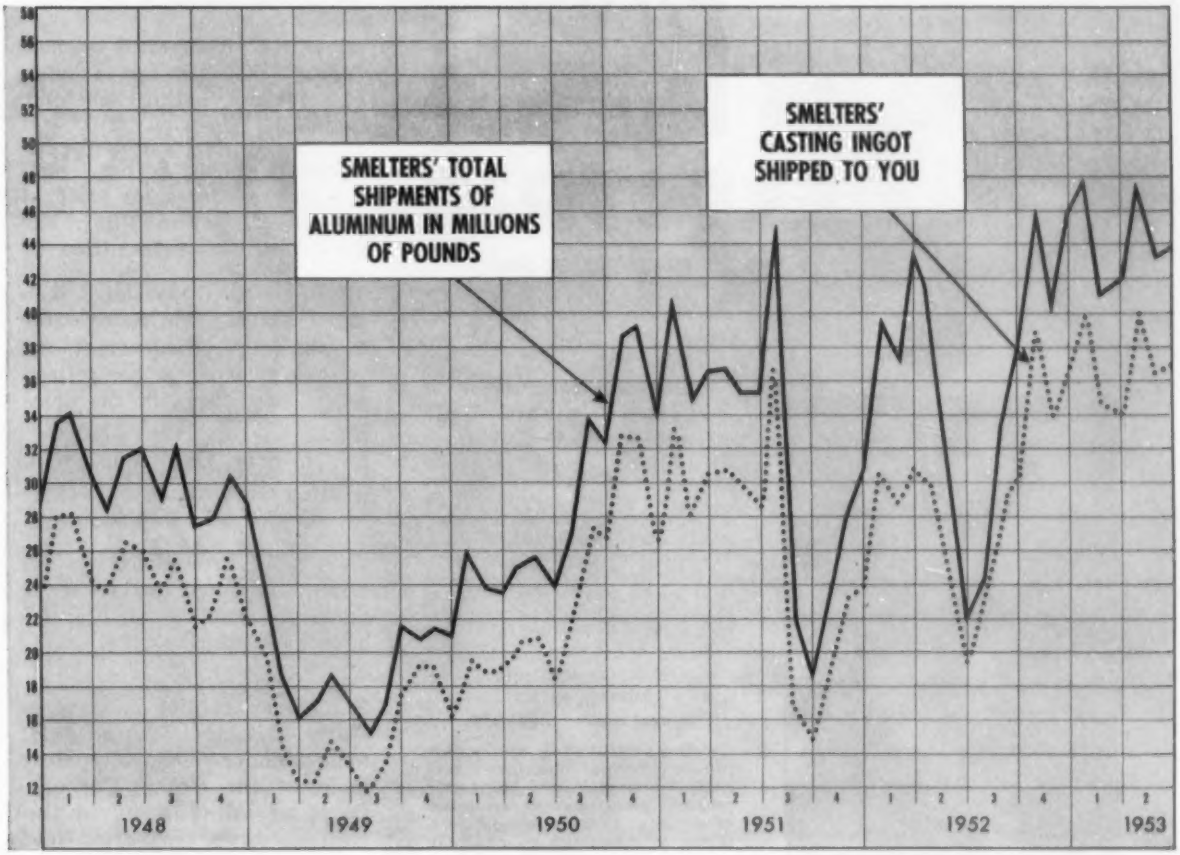
If you'd like to learn more about how the new Baldwin Model "L" can give you higher quality, lower-cost production, send for our new Bulletin 3104. Address, Sales Promotion Dept., Room 4956, Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

BALDWIN-LIMA-HAMILTON

Philadelphia 42, Pa. • Offices in Principal Cities in U.S.A.

For additional information Circle No. 18 on the Reader Service Card

NO FOUNDRY EVER SHUT DOWN FOR LACK OF SMELTERS ALUMINUM!



Why? Because 80% of the smelters' business is furnishing you with aluminum casting alloys. Look at the chart—it shows Bureau of Mines figures on smelters' shipments of all products and shipments of casting ingot to your shops by smelters. You see that shipments of smelters ingot go hand in hand with the needs of the foundry and die casting shops year after year. This performance record is your insurance policy against high inventory costs and costly work stoppages. It is our proudest boast that *no foundry or die caster ever shut down because he couldn't get aluminum ingot from the smelters*—especially when the demand for aluminum was greatest.

We've shipped ingot that was still almost too hot to handle. But, we delivered! In many cases, only *hours* after receiving an emergency call the aluminum smelter's shipment was sitting in your shop. We're proud of that service. We're proud, too, that we've kept pace with the ever increasing complexity of your requirements—that we've developed the alloys you need—constantly improved the quality of our products and supplied you with technical assistance which has many times provided the answers to problems before they have arisen in production. In short, we are alert at all times *to fill your needs*—because you are our biggest customer.

And, just as you would never fail to care for and protect the customers who provide you with 80% of your business, you know that the smelters are going to care for and protect your business.

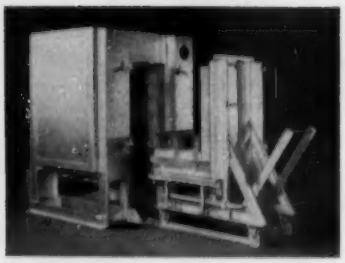
They are your constant and dependable source of supply.

no foundry ever shut down because ingot was not available from smelters!

Aluminum Smelters Research Institute
20 North Wacker Drive, Chicago 6, Illinois

For additional information Circle No. 11 on the Reader Service Card

FERRITES Uniformly fired in Harper ELECTRIC KILNS



HARPER ELECTRIC CAR TYPE KILNS
Temperatures to 2700°F.

For efficient batch pre-sintering and sintering of ferrites. Photograph shows car bottom hearth rolled from firing chamber for easy loading and unloading. Harper kilns are well ventilated to carry off lubricants during firing. Close temperature control gives accurate treatment of product for uniform, high quality results.

HARPER ELECTRIC TUNNEL KILNS
Temperatures to 2700°F.

For fast, continuous, production pre-sintering and sintering of Ferrities. Automatic regulation of temperature gives uniform treatment of product. Definite temperature curves to match varied product analysis can be established and held. Harper electric Tunnel Kilns operate more efficiently through use of recuperation and insulation.

There's a modern Harper kiln in a size and type to meet your production needs. Write today for information.

Box Type

Glass Melting

Car Bottom

Car Type Tunnel

Kiln Builders over 30 Years

HARPER
Electric Furnace Corp.
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For additional information Circle No. 30 on the Reader Service Card

CHANGES IN PERSONNEL continued from page 22

John Glasrud is the newly appointed technical supervisor of barrel finishing research for *Minnesota Mining & Mfg. Co.*

Richard G. Hartnett is the new service engineer for *Acheson Colloids Co.* in the Cleveland, Ohio office.

James D. Dacus, Jr. has joined the magnesium sales staff of *The Dow Chemical Co.* in the Cleveland Ohio sales office.

W. F. Beckley, divisional purchasing agent and coordinator of material procurement for the *Chrysler Corp.* has retired after 33 years with the company.

George T. Fraser has been appointed western sales manager for *Rem-Cru Titanium, Inc.*

Todd W. Fredericks is the newly appointed district manager, Detroit, of the original equipment division of *Aluminum Industries, Inc.*

S. E. Flenner, sales manager of *Alloy Precision Castings Co.* has announced the appointment of the *Gibney-Coffman Corp.* as sales agents in the western and northern New York State territory.

R. H. Christenson has been appointed sales and service representative of the chemical processing div. of the *Detrex Corp.*

Raymond F. Evans has been elected chairman of the board and **John A. Sargent** has been elected president of *Diamond Alkali Co.*

Hydraulic Press Mfg. Co. announces the appointment of three new sales engineers: **Kenneth V. Keidel** in the Cleveland, Ohio office, **J. Jay Smith** in the Chicago, Ill. office, and **Joseph H. Ondras** also in the Chicago office.

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1,000,000 INDUSTRIAL ENGINES

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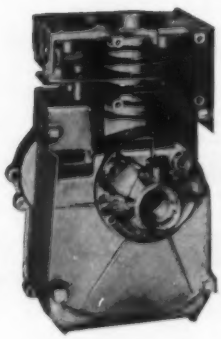
GASOLINE ENGINES

With holding furnaces of 20 kW similar to that in the photo above, and melting furnaces of 100 kW, Briggs & Stratton Corp., Milwaukee, Wisc., is getting increased production under cleaner, more satisfactory working conditions than ever before, *and at lower operating costs.*



The intricate die-cast aluminum cylinder shown at the left is one of many produced at the B & S plant from high grade aluminum alloy melted in low-frequency AJAX induction furnaces. In these furnaces *only the metal is heated.* Energy is transmitted to the molten charge without actual contact through the refractory walls. There are no resistors or other parts having a higher temperature than is absolutely necessary for properly melting the charge. Overheating is avoided, and there is practically no oxidation.

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May we supply you with more data on these and other Glidden products for your field—Glidden Cuprous Oxide, Cupric Oxide and Cubond (Copper Brazing Paste)? Detailed information gladly sent to you on request.

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but it requires a high standard of precision die-casting to produce this aluminium furniture

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WORKS: PROJECTILE & ENGINEERING CO., LTD. ACRE STREET, LONDON, S. W. 8, ENGLAND

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Reference Data From The MPA Show

(As a service for those who could not attend the show, here's reference material that was available. For your copy circle the appropriate number on PMM's Reader Service Card.)

ALLOY METAL POWDERS, INC. — A four-page brochure giving the properties of the nine different alloy powders currently available. Some information is contained on methods of processing the powders and the properties of compacts made from them. No. 105

AMPLEX DIV., CHRYSLER CORPORATION — Catalogs, bulletins, reprints describing Oilite bearings, metal powder parts, filters, etc. No. 106

ANTARA CHEMICALS DIV., GENERAL ANALINE & FILM CORP., — Complete descriptive catalogs and pamphlets describing carbonyl iron powders, the properties, analyses, uses, etc. No. 107

BALDWIN-LIMA-HAMILTON — Descriptive literature on the special metal powder presses. No. 108

CHICAGO POWDERED METAL PRODUCTS CO. — A brochure showing many of the parts made by the company and a tabulation of properties. No. 109

COLONIAL ALLOYS CO. — A four-page reprint describing the impregnation and surface finishing of powdered metal parts. No. 110

EASTON METAL POWDER CO., INC. — A brochure describing RZ iron powder and separate data sheets giving the chemical and physical properties of the iron powders this company can supply. No. 111

THE ELECTRIC FURNACE CO. — Descriptive sheets on sintering furnaces, gas generators etc. No. 112

FEDERAL-MOGUL CORP. — A 15-page booklet describes the company's bearings & bushings. No. 113

THE GLIDDEN C. — A four-page brochure describes Resistox metal powders. A specification sheet is included. No. 114

CHAS. HARDY, INC. — Nine separate data sheets giving the chemical and physical properties of many of the metal powders available. No. 115

HARPER ELECTRIC FURNACE CORP. — Three brochures available on mesh belt conveyor furnaces, heat-treating furnaces and high temperature Glo-bar heated furnaces. No. 116

HOEGANAES SPONGE IRON CORP. — A 12-page booklet describing a new iron powder, "Ancor 80". Numerous tables of properties and charts showing property variations are included. No. 117

KUX MACHINE CO. — A press catalog and a reprint on presses for forming powdered metal parts. No. 118

LINDBERG ENGINEERING CO. — A group of brochues and reprints describing sintering furnaces and associated equipment. No. 119

continued on page 84

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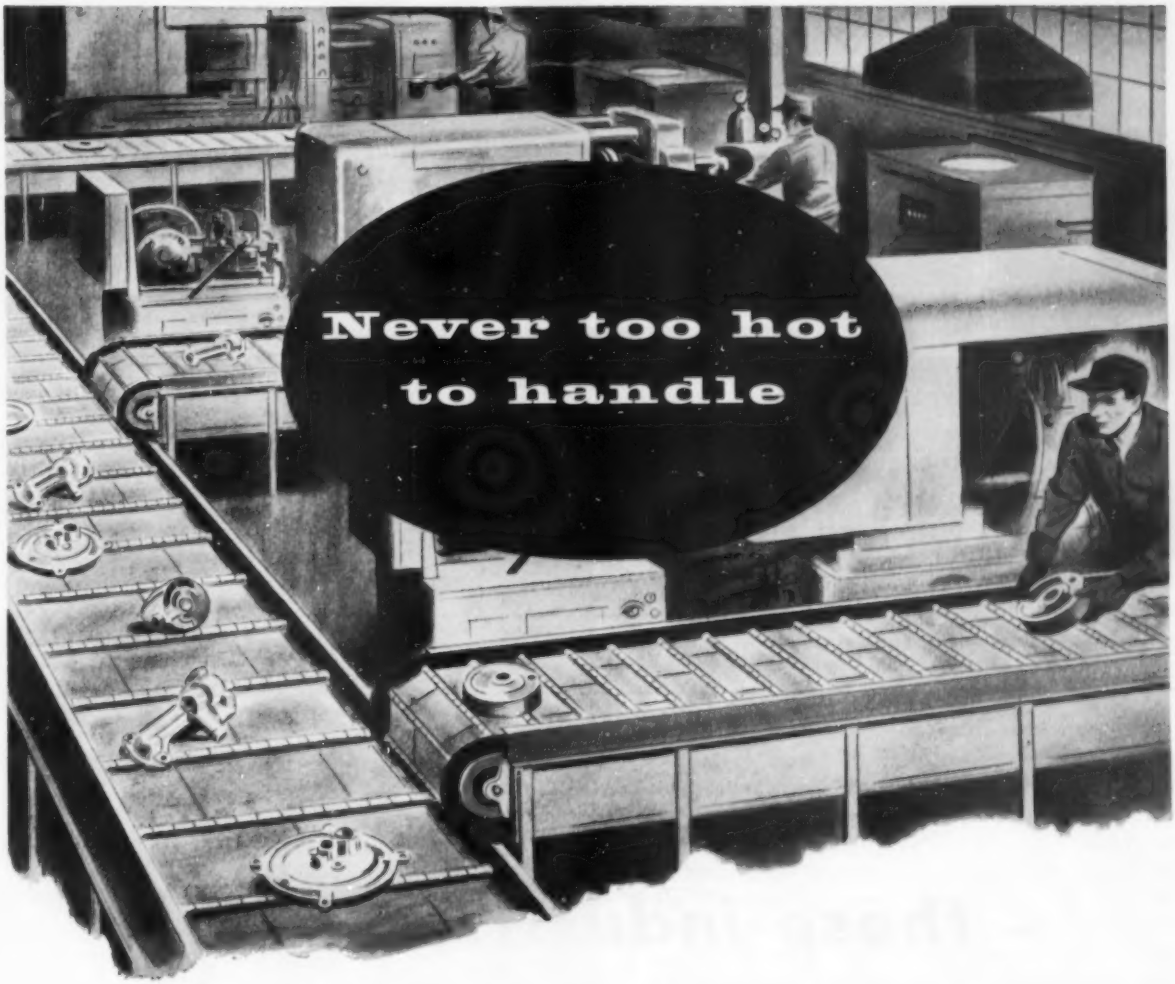

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Precision formed from heavy gauge steel, MAY-FRAN hinged links are assembled by means of high carbon steel rods . . . side chains become an integral part of belt. Outside links incorporate interlocking wings which remain positively engaged at all times and keep parts on belt.

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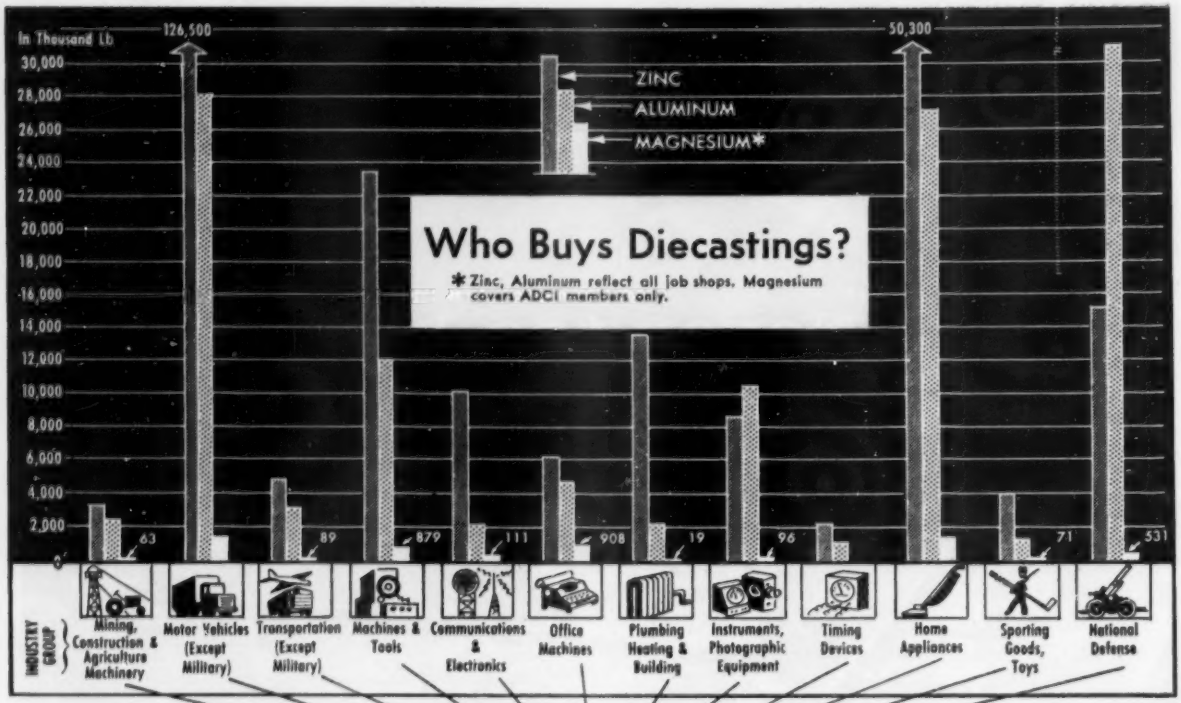

DATA by courtesy of *THE IRON AGE*

these industries do!

Applications of zinc base die castings are so varied and widespread, it would be almost impossible for anyone to go through an ordinary day's routine of living without using—directly or indirectly—a large number of devices, appliances and services in which zinc alloy die castings form essential parts. The chart above, which shows sales by job shop die casters in 1952, tells its own story. More significant, perhaps, is that these sales were nearly six times the value of sales in 1936. Even considering rising costs and prices during the 16-year period, this is a remarkable record, and is representative of the entire die casting industry.

A prime factor in the steadily growing use of die castings has been the recognition of the die casting process for what it has proved itself to be: One of the fastest and most economical production techniques at the command of the metal-working industry today!

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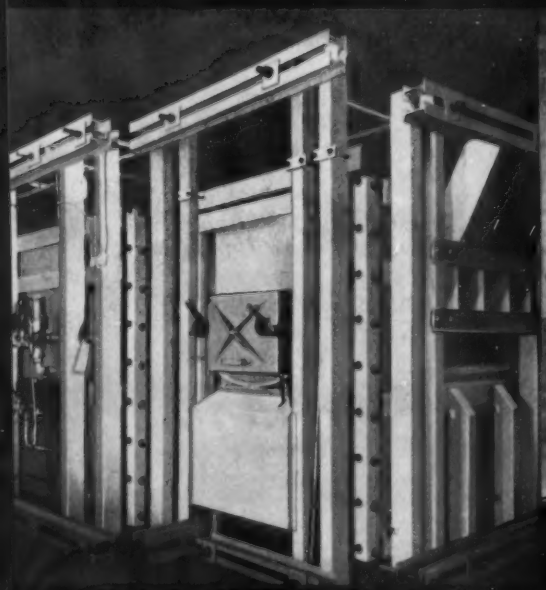

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THE NEW ENGLAND DIE CASTING CO.
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DIE CASTINGS

Cast-In Steel Insert

- **Transmits Torque**
- **Absorbs Impact**

THE high speed tapping head manufactured by the Procunier Safety Chuck Co. owes much of its speed and assurance against tap breakage to the unique reversing mechanism used. This reversing mechanism, in turn, is made possible partly because the hub for the reversing clutch can be die cast in the desired shape.

The hub must stand considerable torsional loading as well as some impact at the moment of reversal. Further it must be so designed that the cork clutch facings will be anchored securely and permanently.

All of these features incorporated in the die cast hub could, of course, be secured in a part machined from steel or from a machined sand casting, but only at a greatly increased manufacturing cost.

For high speed precision tapping, the benefits derived from the lighter die cast clutch hub result in more sensitivity and more accurately tapped holes.

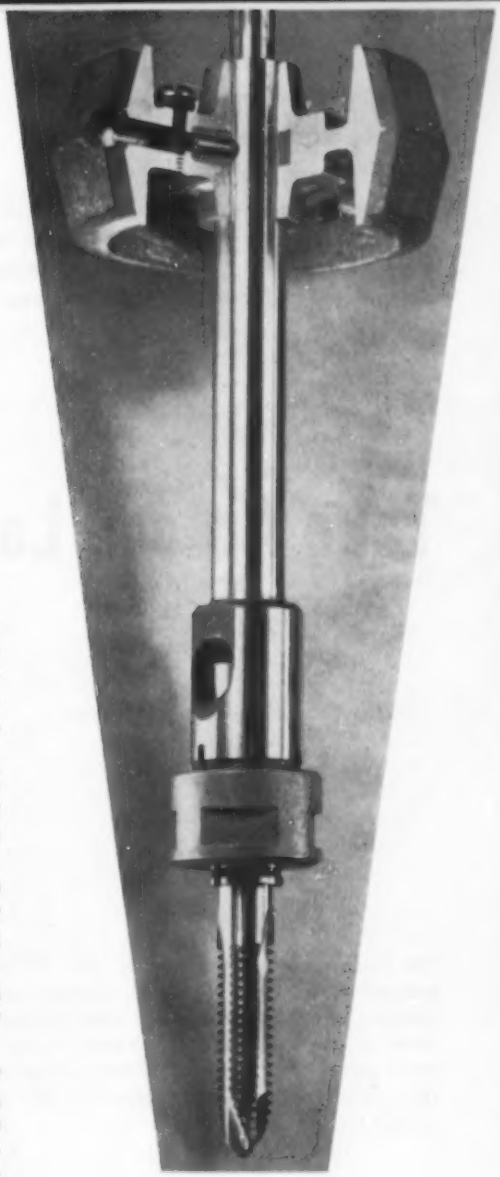
As can be seen from the sectioned clutch member in the illustration, a steel insert is cast in. Were this insert omitted, the constant peening action of the steel drive pin on the die cast zinc would tend to enlarge the pin hole in the casting resulting in back-lash, chatter, and ultimate failure. With the insert, which is easily incorporated in the casting this possibility is completely eliminated. The insert has the further advantage of giving a greater area over which the shear stresses are distributed, an added factor of safety.

While the particular adhesive used to fasten the cork facings to the hub is probably adequately strong without any reinforcing good design dictated some sort of a locking arrangement. Small ribs were, therefore, cast onto the hub faces and the cork performs pressed over these ribs. The combination of reinforcing ribs and adhesive gives a joint which never fails in service.

Finish machining on the casting is quite simple. The hole for the drive shaft is cored and needs only be cleaned up to size. The two holes for the machine screws that hold the drive pin laterally are drilled and tapped and finally the two faces are rough ground on a production tool and cutter grinder.

No surface finish for decorative or corrosion protection purposes is necessary on this application.

This hub as made by Central Die Casting Co. is one of a large group of parts where engineering and design coupled with economical manufacturing procedures will allow only one method of production — die casting.



Adhesive plus ribbing on the die cast clutch hub give a firm bond between the hub and the cork facing.

BY J. A. McCONNELL, President
Procunier Safety Chuck Co.

Part Two

Current developments and some process peculiarities are reported in this article, written originally as a series of letters from a foundry executive to his customers. Briefly covered here are materials and equipment requirements of the process.

Take A Good Look At Shell Mold Casting

BY WILLIAM S. THOMAS, Vice President
Emmaus Foundry and Machine Co., Inc.

(In Part One of this series, Mr. Thomas offered a realistic appraisal of what shell mold casting can and cannot do, listed 11 specific advantages besides dimensional accuracy, and introduced some of the materials employed in shell molding. In the third and final part, he outlines common sense approach to tolerances, pattern problems, and an analysis of the economics of shell molding. — Ed.)

IN the works is a procedure whereby the consumer can precoat his own sand if he so desires. This arrangement would tend to lower the cost of resins due to lesser amounts needed.

The mold making operation is more or less a mechanical one and neither involved or difficult, requiring less than a two minute cycle. There are both hand operated and automatic machines available that will produce a completed shell at rates of 40 to 75 per hour according to the size of the shell or casting.

There is a fertile field for the development and production of a medium priced machine for making shells. Generally speaking foundries have designed and constructed their own machines, and therefore are not available to the public.

It is probable that many of the molding machine manufacturers will design and build various types of shell making machines for various classes of castings, similar to present day squeeze molding machines.

The same holds true for core blowing machines. The use of conventional types of core blowers is impractical because of the tendency of the powdered resin to separate from the sand with resultant lack of binder in certain areas and segregation or building of bond in other areas. The use of the procoated sand previously mentioned would no doubt overcome this problem.

A later and newer method of shell molding has recently been developed and is known as the "D" process, developed by Harry W. Diebert, the well known sand consultant.

The process uses a liquid resin binder which coats the grains of sand thus preventing separation. Patents on both the process and liquid binder are being requested.

There is nothing mysterious about the construction of pattern equipment for shell molding except that the cost is higher due to the accuracy required and the special rigging necessary. The material used for patterns should be able to withstand repeated heating to a maximum of 600° F. Patterns are arranged on plates so that both halves, or cope and drag, match with locators established on the plate surface. The locators are a male and female type set into and above

the plate surface to create a corresponding condition on the joint face of the two halves of the shell mold.

Patterns can be made from any of the metals generally used in conventional work. Aluminum, which can be processed at reasonable cost, can be used for experimental work and for small quantity runs, that is, up to possibly 5000 shells, after which they may have to be replaced. Where irregular partings are encountered, aluminum pressure plates give good results.

Draft, Holes and Ejectors

Long wearing iron patterns that will take a high surface finish are most suitable as shell patterns. This material is also most suitable for the pattern plates particularly if the plates are stress relieved before finishing. Alloyed gray iron of an analysis containing some nickel and chrome will give excellent results.

Shell molding is similar to other casting techniques from a draft allowance standpoint, and although it is the general idea that little or no draft is necessary, it is somewhat hazardous unless all variables are closely controlled. There is no standard angle that can be universally recommended — for draft purposes the same conditions exist as in green sand molding — it depends on the type of casting to be produced and the accuracy of the pattern.

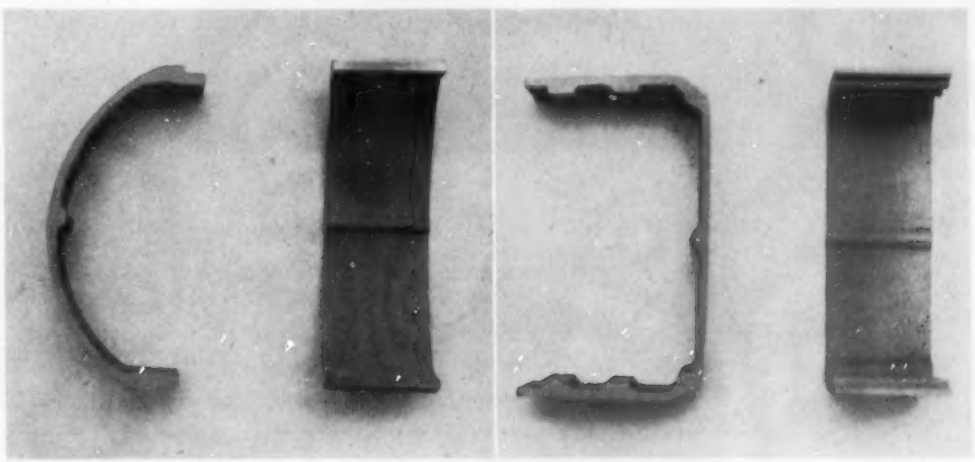
In contrast to green sand molding, holes or chambers lend themselves to better ejection than an exterior projection, such as the holes in a wheel as compared with the outside diameter of the hub. The reason for this is that there seems to be a slight shrinking action of the cured shell against these outside surfaces or projections. Shells can be made with draft as low as 1 degree at some points if other vertical surfaces are allowed some excess draft.

Ejector pin design and location is one of the most important factors in shell molding. These must be properly located and be of simple design. The best and cheapest seems to be the common carriage bolt with the square under the head and the under side of the head turned to a smooth finish. These, with light stainless steel springs and nuts, make an ideal ejector arrangement.

After the molds are made they must be held together for pouring. There are a number of techniques used to do this, some are poured with back-up material consisting of steel grit or shot, steel balls, and slag or sand. Spring clips are also used, especially on molds where metal volume is not too great; pasting is also extensively used.

Temperature is an important factor in shell molding.

continued on page 91



Walls Too Thin To Be Sand Cast, But By Shell Mold Casting . . .

. . . these electronic device parts are in regular production. Walls are .080 thick on these aluminum castings. Surface finish is suitable and better ductile qualities are obtained.

Here's The Way To Spot Weld A Die Casting

BY welding aluminum die castings to drawn or stamped forms. designers may be able to gain new product features that depend upon varying section thickness. Philco has found welding of aluminum die castings to be a simple production operation. Here is a report on their experience.

New Design Features Possible By Welding Die Castings To Sheet

THE design possibilities for using aluminum die casting welded to sheet metal have been investigated by very few engineers, perhaps because they have not been aware that aluminum die castings can be welded to stampings or sheet forms on a production basis with little difficulty.

Die cast valves, pipe connections, frames, stiffeners, hinges or mounting pads, for example, might very well be permanently and rigidly assembled to deep drawn shells by welding where riveting, screws or other fastening devices are impractical.

The complex configurations permitted in a die casting can be made an integral part of a sheet metal assembly to give design features not otherwise attainable at moderate cost.

How this can be accomplished is illustrated by a production job recently completed by the Philco Corporation, Philadelphia.

The product is a lightweight, waterproof aluminum housing for radio receiver- transmitters used in Army tanks, jeeps and combat vehicles. The body of the housing is fabricated by inert arc welding, sheathed with a rigidized aluminum wrap-around that is spot welded to the body.

To attach a watertight cover to this housing, a die cast frame is welded to the top of the housing. This frame serves as the stiffener for the edge and also incorporates recesses that retain the cover clamps. By means of this aluminum die casting, rigidity, watertightness and fastening provisions are obtained.

The sheet metal shell to which the die casting is welded is 52S quarter hard; the die casting alloy is ASTM B85-46T SC6, which includes 3.0 — 4.0 percent copper and 7.5 — 9.5 percent silicon.

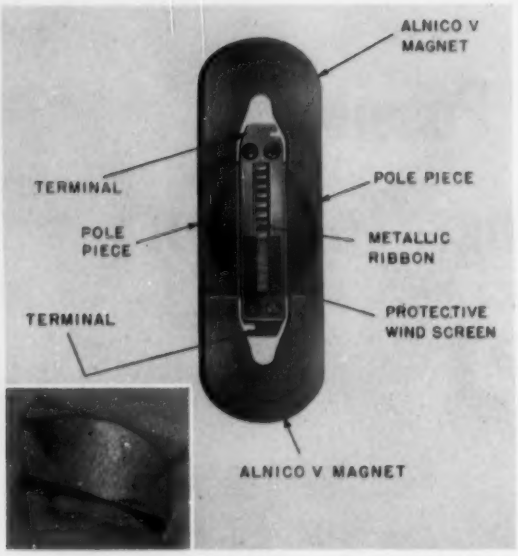
The die casting is attached to the housing by means of 30 spot welds. The only critical dimension that needs to be established between the die cast frame and the sheet metal housing is the distance between the center of the locking recess in the casting, and the top edge of the sheet metal. Since it is not possible to hold this dimension close enough by means of the welding fixture, a light milling cut across the top surface is required after welding.

Equipment used for spot welding is a 100 KVA Sciaky three-phase welder. Ampco WC2210 tips are used for this application. One of the problems in this welding operation is proper dressing of the tips. Frequent dressing is necessary because when aluminum is picked up on the tip, arcing results.

It was found, in setting up the welding cycle, that longer hold time than normal is needed. The forging action which occurs when the weld is at heat gives a stronger joint because of the mechanical pressure on the softened area. This was found to decrease the number of rejects.

Surface preparation of the castings is critical. Procedure followed at Philco in preparing the castings starts with a caustic etch, followed by etching and chromate treating in a Clepo 180 bath. A one minute dip in a Koroseal lined tank at room temperature was used.

Most effective welding, it was found, must be done not longer than ten hours after the surface preparation processing. Little trouble was encountered by following normal, good welding practice.



1. ACOUSTICAL CAVITIES of very accurately controlled shape are obtained by investment casting the pole pieces (inset) for this Gradient[1] microphone.

Here Are Two Ways To Make

Microphone Pole That Meet

BY HENRY R. HEENAN, Design Department Manager
Shure Brothers, Inc.

IN the early days of radio, the microphone manufacturer was faced with only one problem — to make an instrument that would pick up sound adequately. The size of the individual units mattered little and the quality of pick-up was not as critical then as today.

With the advent of public address systems, it became desirable to decrease microphone sizes so that the speaker's face was not obscured. More recently, television has made further size decreases imperative since the microphone must be very small and of high sensitivity so that it can be located outside of camera range.

Thus, you can see that technological requirements are placing an increasing burden on the designer of microphones. Fortunately, parallel to this technological advance, has come an equal advance in metals fabricating. As the designer is forced to continually decrease the size of the units, such fabricating methods as powder metallurgy, investment casting, die casting and plaster mold casting have advanced so that the necessary qualities, whether they be structural, electrical or magnetic, can be secured in smaller packages.

Accurate Control of Air Gap

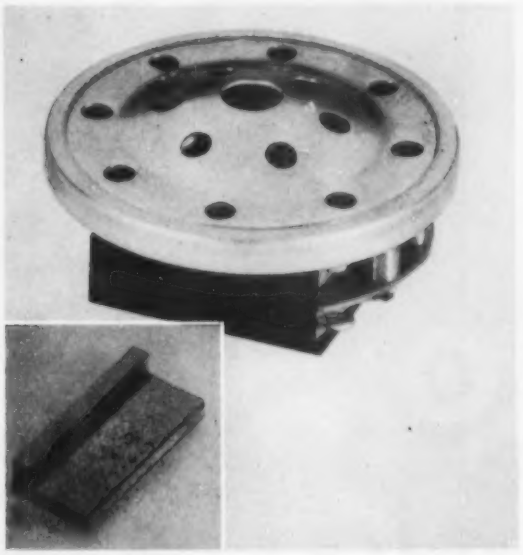
As a first example, consider how metallurgical advances have helped the manufacture of the Gradient[1] microphone. The internal structure of one of these instruments is shown in Figure 1. All of the characteristics that were desired in this unit could be secured, provided pole pieces of the most desirable composition and shape could be obtained. The two pole pieces had to meet stringent dimensional control to maintain a strong, uniform, magnetic field across the air gap. Furthermore, the composition of the steel was was very critical.

Since the shape of the acoustical cavity controls, to a great extent, the performance of the instrument, machining of the cavity was a major problem.

Through the use of investment casting, however, it is possible to manufacture pole pieces that are dimensionally correct and more importantly are precise duplicates so that there is no variation in performance due to improperly shaped acoustical cavities or to varying air gaps or joints between the magnets and the pole pieces.

A further great advantage of investment casting for this piece is that the composition of steel can be held much more precisely, due

Pieces Today's Requirements



2. MAXIMUM FIELD STRENGTH is obtained in the pole pieces (inset) for this Controlled Reluctance microphone by using high density powdered metal components.

in part to the small batches of metal that are melted at any one time and this melting can be under the most desirable conditions.

These investment cast pole pieces, then, as fabricated by Casting Engineers, Inc., have made possible a small Gradient[1] microphone whose pick-up qualities are good, that can be manufactured economically and assure uniform performance from instrument to instrument.

Improved Magnetic Properties

In a different type of microphone, the so-called Controlled Reluctance type, somewhat different problems are encountered. As in the Gradient[1] unit, the design and fabrication of the pole pieces was a major manufacturing headache. One of these microphones and the pole pieces for it are shown in Figure 2.

In this case, a pure iron pole piece is required. The shape is relatively simple, but as in the previous case, dimensional control and accuracy of manufacture are of prime importance. To manufacture the pole pieces by machining out of bar stock was costly since there was a high scrap loss and the excessive amount of cold work required special annealing to re-establish the best magnetic characteristics.

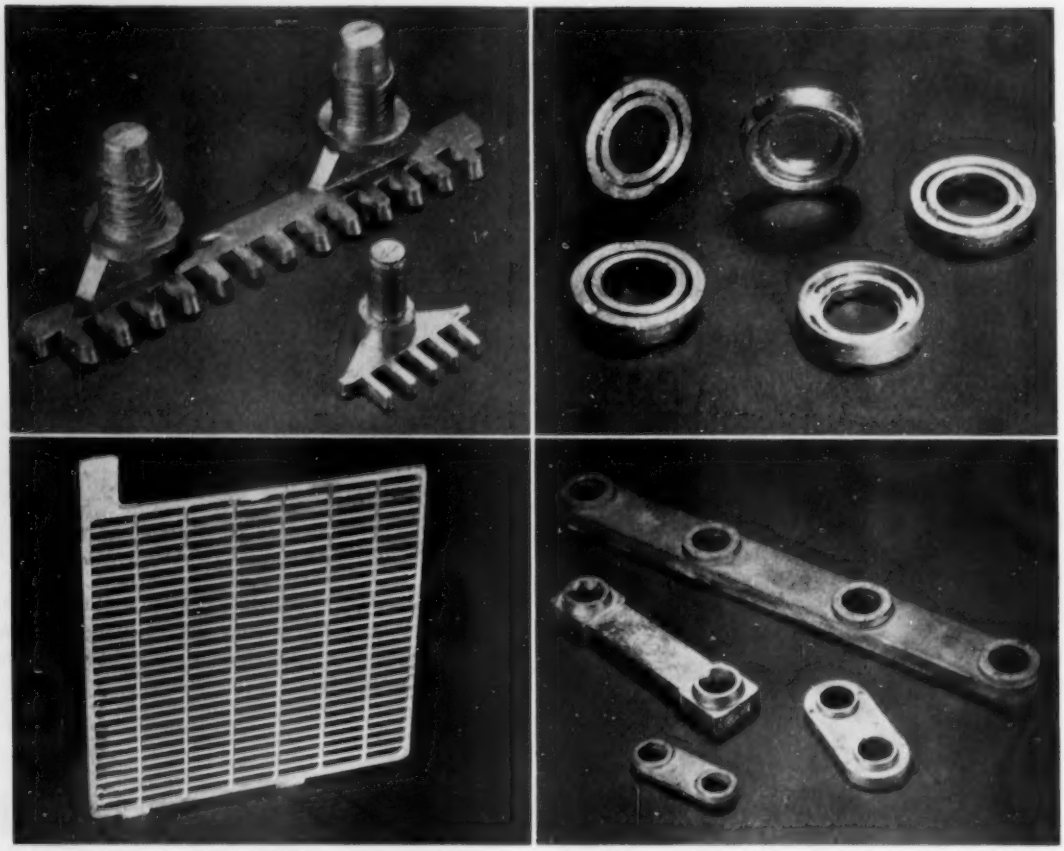
At one time, the parts were fabricated from two pieces of plate stock joined together by machine screws, soldering or brazing. Not only did such an assembly cost too much to manufacture, but its magnetic characteristics were not as good as desired.

Solution to this problem was found in powder metallurgy. The pole pieces are molded as a single unit having all of the di-

continued on page 87

TELEVISION and improved public address systems have had an important influence on the design of microphones to obtain the optimum performance while reducing the size of microphones as much as possible. The precision of investment casting and powder metallurgy have helped in this redesign.

PERMANENT MOLD CASTINGS — DIE CASTINGS



Shaping Lead For Structural Applications

BY ROBERT G. BRAMM, Plant Engineer
Surrette Storage Battery Co.

LEAD as a structural material is used principally in three general applications. Where resistance to certain types of corrosion, notably sulfuric acid, is required, where high mass per unit volume is needed such as counter weights, etc., and where high density shielding is required such as in X-ray work.

The plumbing trade uses considerable lead, of course, but generally not as a structural material.

These uses of lead indicate that it must be fabricated by a wide variety of methods and among the many methods used are die casting and permanent mold casting.

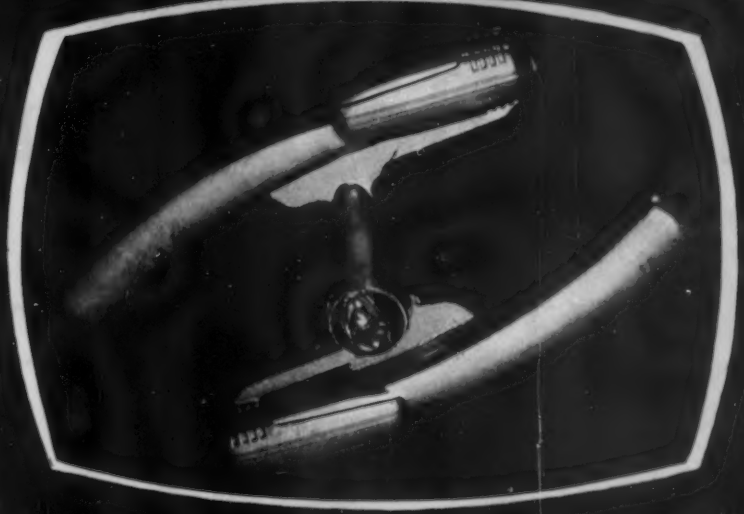
In the following illustrations, all of the parts are used on lead storage batteries. The fact that they are thus used does not imply usage limitations, but rather serves to illustrate the wide variety of shapes and products that can be cast in in lead.

The products illustrated cover both die and permanent mold casting, both thin and heavy sections and even quite small cored holes and slots.

In general, where threaded products are used, the thread is fairly coarse and is often a cast thread. In many cases a thread may be cast and used without subsequent chasing. Internal threads, especially in permanent mold casting, are often cast using a revolving core.

Circle No. 2 on the Reader Service Card

telling the story of 'dag' dispersions



Compare Your Present Die Lubricant With 'dag' Colloidal Graphite

Your Present Die Lubricant	'dag' Colloidal Graphite
1. Is it difficult to apply?	1. Easily and quickly sprayed on, painted on, or applied by dipping.
2. Does it break down at high temperatures?	2. Totally unaffected by heat up to 750°F. Forms tenacious *dry lubricating film* on die surfaces.
3. Does it fail to prevent *all* die sticking?	3. *Prevents all sticking in the die.*
4. Does it present production problems?	4. Improves product finish, reduces carbon build-up in die impressions. Can also lubricate ejector pins and plungers... prevents sticking and jamming.

More advantages of 'dag' colloidal graphite dispersions are explained in Reprint DC and Bulletin No. 426-F

Dispersions of molybdenum disulfide are available in various carriers.

We are also equipped to do custom dispersing of solids in a wide variety of vehicles.

dag DISPERSIONS **Acheson Colloids Company,** Port Huron, Mich.
...also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND

try 'dag' resin bonded dry films for permanent lubrication

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BECAUSE of the rapidly expanding capacity of the aluminum industry—led by Kaiser Aluminum—you can be sure of adequate supplies of pig, ingot and billet, now and in the future.

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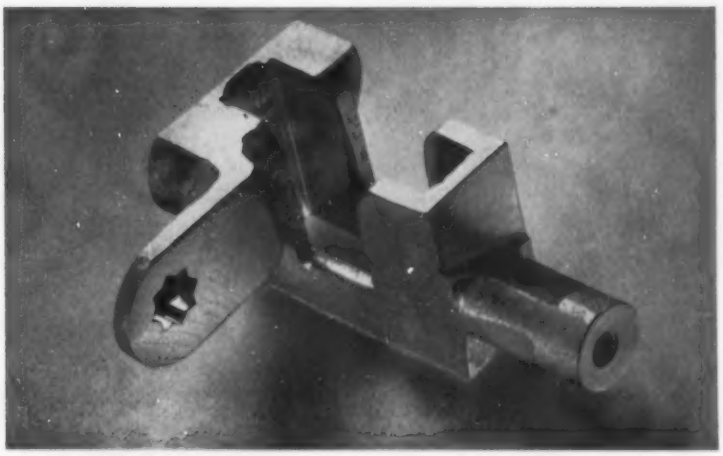

SAND CAST FORERUNNER of the now investment cast aircraft brush holder is shown here. Note the large amount of finish machining required to meet aircraft specifications.

Cost Cut 50 Percent On Small Brush Holder

BY W. A. BROADLEY
Chief Development Engineer
National Pneumatic Co., Inc.
and Holtzer-Cabot Divs.

ONE of the earliest industrial uses of investment castings was in the manufacture of brush holders for electrical equipment. Prior to the use of investment castings, almost all large brush holders were sand cast and then machined. This process of manufacturing left much to be desired. The amount of machining that was needed was excessive, and in many cases, because of the inability of the sand casting process to produce parts with thin wall sections, the overall size and weight of the entire machine had to be increased to give enough space to mount a sand cast brush holder.

The brush holder illustrated is for a 100 ampere aircraft inverter. It differs from the usual product of its type in the depth of the throat which allows very high utilization of the brushes while still maintaining adequate contact and current carrying capacity.

This particular unit is cast in bronze by the Arwood Precision Casting Corp. and, while it requires more than the usual amount of finish machining because of rigid aircraft tolerances, still shows a saving on the finished part of from 40 to 50 percent.

Final machining of the part is to drill and tap four small holes, broach the star hole in a previously cored hole, and broach the slide for the brushes. Generally some of the exterior surfaces are sanded.

The holder is surface finished by chromium plating all surfaces including the brush slide.

SHELL MOLD DESIGNING INCLUDED IN COPPER ALLOY CONFERENCE

Invitations are being extended to design engineers concerned with cast stainless steel components to attend an unusual all-day conference June 24 as guests of The Cooper Alloy Foundry Co., Hillside, N. J.

According to Herbert J. Cooper, executive vice president, the conference is being called to help design engineers review the latest in high alloy developments as well as to study the shell mold process and its effect on casting design.

Program includes: 1) A guided plant tour covering pattern making, core making, sand, centrifugal and shell molding, melting practices, testing, etc.

2) Properties and characteristics of stainless alloys.

3) Principals of casting design.

4) Presentation of specific case histories showing how to cut costs and improve quality.

5) Discussion of shell molding and its meaning for design engineers.

6) Designing for cast-weld construction.

Invitations to attend the conference which gets under way at 10 a.m. may be secured by writing or calling the company's public relations division.

here's how
(AND WHERE)
to end your SMALL PARTS problems
GRC DIE CASTINGS ------ AT THE MODERN GRC PLANT
. . . give you economy, plus almost unlimited design flexibility. From the simplest to the most complex designs, GRC zinc alloy castings meet size, shape and tolerance specifications precisely — and uniformly! They come to you ready for assembly without further machining; quantities of 100,000 to many millions.
. . . tiny nylon and other thermoplastic moldings, as well as zinc alloy die castings, are formed in one piece and in one high-speed, low-cost automatic operation. Tooling costs are low, there is no scrap loss, and secondary operations are virtually eliminated. Cast or molded GRC tiny parts may be the difference between success and failure of your new design.
Die Cast Parts
Maximum Wgt. ½ oz.
Maximum Lth. 1-¾"
Write for bulletin and samples today. Send prints for quotations.
GRIES REPRODUCER CORP.
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GRC

REED-PRENTICE ELECTS FIVE OFFICERS

Reed-Prentice Corp., Worcester, Mass., manufacturer of machine tools, die casting machines and plastic injection

F. W. McIntyre, Jr.

molding presses, announces election of officers as follows:

Frederick W. McIntyre, Sr., president since 1944, elected chairman of the Board of Directors;

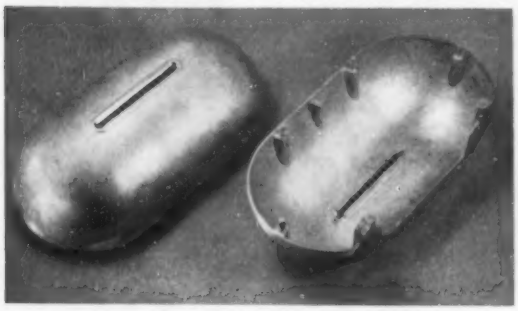
Frederick W. McIntyre, Jr., moves from the vice-presidency to assume position of president;

Donald H. Dalbeck, Corporation controller and treasurer, elected a director and vice-president;

Iver G. Freeman, for 38 years at Norton Company in Worcester, becomes a Reed-Prentice vice-president;

Eugene T. Connolly and Douglas L. Brennen retain their respective positions as secretary and assistant treasurer.

Die Castings Can Simplify Assembly



ONE factor that makes a die cast housing particularly suited for high speed assembly is that all sorts of lugs, bosses, cored holes, etc. can be incorporated.

One fastening method often overlooked is the use of spring-type clips pressed onto a cast stud.

Where it is possible to use this type of fastener not only is assembly speeded in the actual application of the clip, but the studs, if carefully located serve automatically to align component parts.

A typical application is shown on the end caps illustrated. Here four studs cast integrally with the cap automatically align the cap and the part to which it is fastened and a simple spring clip can then be pushed onto the stud to hold the parts firmly.

GET GENUINE IMS SILICONE SPRAY from
INJECTION MOLDERS SUPPLY CO.
3514 Lee Road Cleveland 20, Ohio

BEWARE
OF CHEAPENED IMITATIONS!

YOU GET JUST WHAT YOU PAY FOR IN MOLD RELEASES

* *MORE of the Right Silicone*
* *FEWER PIECE MARKS from Costlier Drier Propellent.*
* *BETTER ATOMIZATION*
* *FASTER SHUT OFF With Exclusive All Metal Spray Head.*

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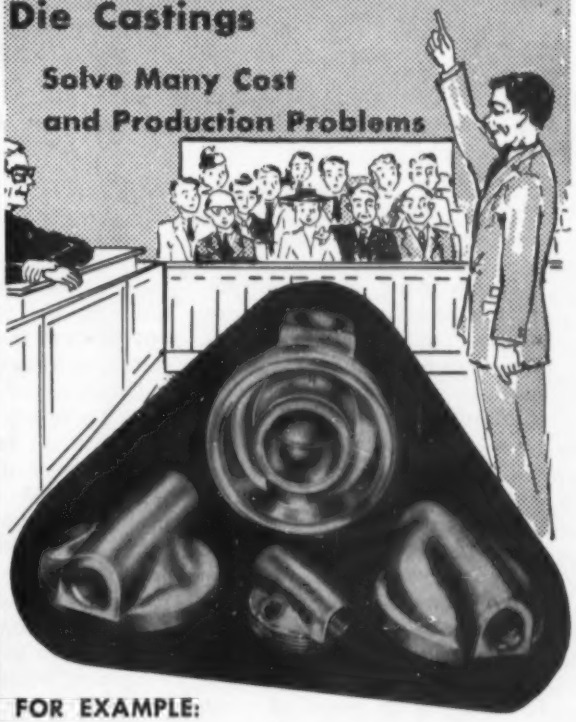
ALL *YOU* Want— Are the *FACTS*

Aluminum and Magnesium Die Castings

Solve Many Cost and Production Problems



FOR EXAMPLE:

The heads for air line lubricators and filters shown here have been ideal *solutions* for designers and engineers who have been on the *trail* of production costs. Cost Savings resulting from virtual elimination of machining labor combine with the attractive designs permitted by die casting. They open new markets for these products as produced by such manufacturers as Keller Tool Co. and Master Pneumatic Supply Co. for a highly competitive field.

Let's Talk It Over . . .

LITEMETAL DICAST, INC. is an organization of specialists—men thoroughly experienced in the casting and machining of magnesium and aluminum alloys. Our equipment includes big machines for big jobs—little machines for little jobs . . . the right sizes and types of the most modern die casting equipment for producing parts from the size of a button to large cable spools. Complete facilities for secondary operations are also available.

Write today for literature and design information. Quick action on inquiries.

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PLANT AND EXECUTIVE OFFICES

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QUIET . . . Die Castings At Work

BL D. H. RUSSELL, Product Engineer
Lynn Products Co.

IN designing an oil burner, particularly one to be used on household heating devices, the engineer must reduce the number of working parts to a minimum and must design these parts so that the unit will be as trouble free as possible. When repair or adjustment is required, the unit must be so designed that it can be be serviced easily to keep down-time of the heating equipment as low as possible.

The housing for one of these oil burners is no less important from a design point of view than the mechanism. It must serve the important function of covering the working parts and be amenable to an attractive finish. In addition, it must provide a means of mounting and aligning the various components such as the motor, blower, pump and burner.

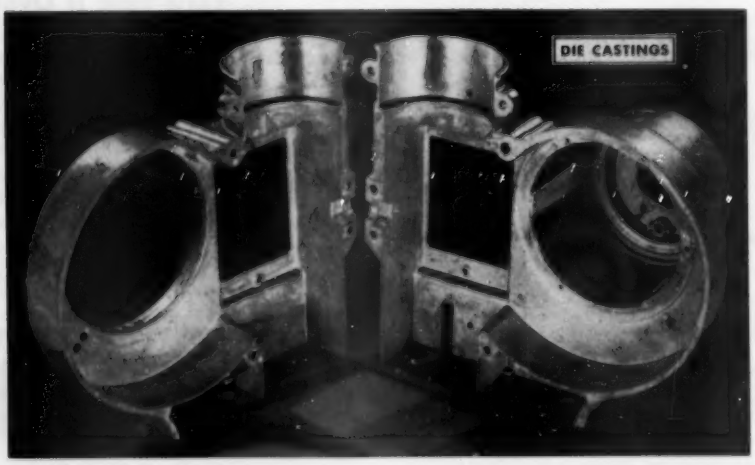
Quietness of operation is another primary requisite of a domestic oil burner. In those cases where drawn or otherwise formed sheet metal is used, the burner assembly must be provided with a rigid frame work to hold the components and to serve as a supporting means for the sheet metal. With such construction, vibration, some of which is inevitably present, will gradually loosen the fasteners allowing annoying rattles to develop.

The zinc die cast housing used by the Lynn Products Co., Inc. on one size of domestic oil burners fulfills all of the requirements for a good housing. Redesigned from a sand casting in 1938, the present two piece assembly has reduced assembly and finishing costs sharply, it has eliminated possible noise from loose cover plates and shrouds and further serves as a rigid mounting for the motor, blower, pump and burner nozzle.

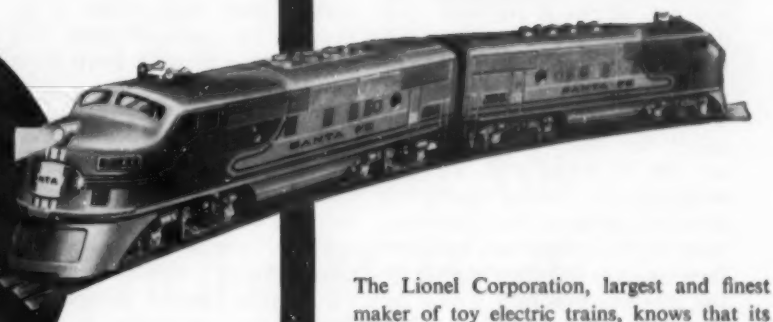
The design has so simplified assembly that the only machining operations now performed are simply drilling and tapping and one combined facing and reaming operation.

When the castings are received from the supplier, they

continued on page 54



Beautiful— but tough to build...so



Lionel chose **Kux** Die casting machines

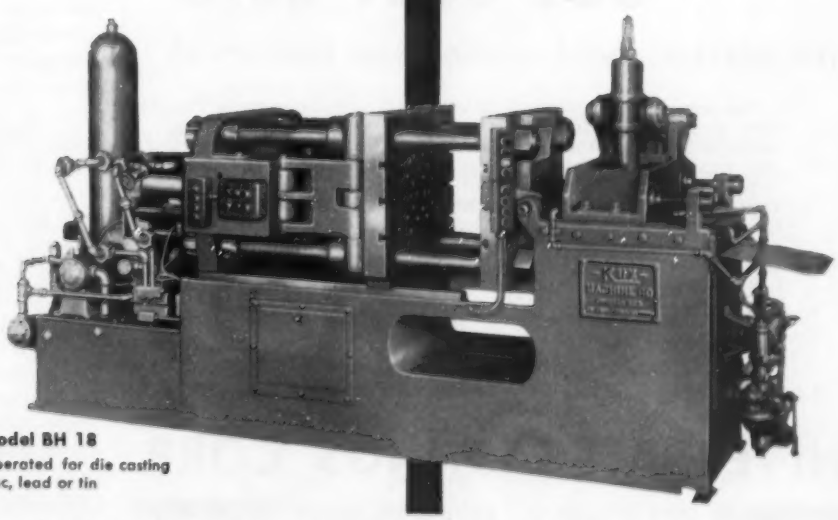
to get perfect detail in its scale model trains

The Lionel Corporation, largest and finest maker of toy electric trains, knows that its customers require exactness of detail from gear boxes to the colors in the insignias of famous trains it reproduces. Much of this detail is possible only because of the perfection obtained by the use of die cast parts made on KUX machines. Lionel finishes must match those of the real life counterpart to the minutest detail . . . they have to be tough and durable enough to withstand the knocks of railroads operated by boys from "six to sixty."

KUX Die Casting Machines produce tough, smooth, non-porous castings that make these finishes possible. They add strength to the trains, provide superior performance, and permit an economy of production so Lionel can sell its products at the lowest possible price.

KUX engineers can help you solve equally tough production problems with exactly the right machine to meet your requirements . . . whether it's tiny gear boxes or gigantic castings. A letter or card will bring you full information.

KUX MACHINE COMPANY
6725 N. Ridge Ave. • Chicago 26, Ill.



Model BH 18
Hydraulic operated for die casting zinc, lead or tin

For additional information Circle No. 42 on the Reader Service Card

Oil Burner Housings Redesigned For Quiet Operation - Cont.

are set up in a jig and two dowel holes drilled so that the two halves will be held in proper alignment. Following this, the housing half that is to carry the motor and pump is set up in a jig and a hand reaming and facing operation done which sizes the mounting hole for the pump and cuts the face exactly at right angles to the mounting hole.

A few of the other holes that must accommodate machine screws may then have to be tapped, but in most cases this tapping has already been done by the foundry.

Simple Finishing Procedure

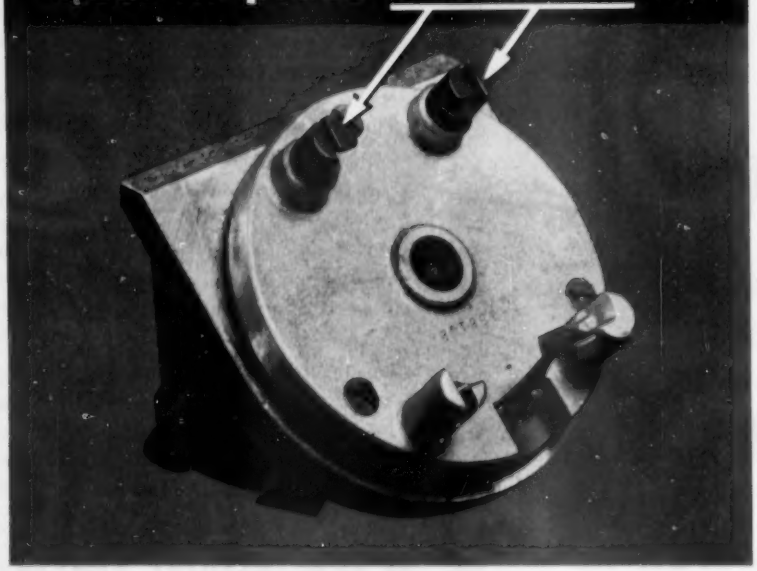
Since the as-cast surface of the housing is sufficiently smooth for painting, the only surface preparation that is necessary is to clean and etch for proper paint adherance. This latter operation is done by dipping in a proprietary cleaner and etchant "lithoform", a product of the American Chemical Paint Co. After drying, the housings are sprayed with a single coat of enamel and baked.

After baking, all of the component parts of the burner are assembled on or in the housing.

As has been pointed out many times, die casting is the only fabricating method where it is possible to incorporate all of the required mounting members, holes, etc. so that assembly costs can be reduced. While other methods of making the housing could, of course, give an equally rigid housing, none of them can give the required accuracy, the small cored holes, the thin wall sections or many of the other advantages of die casting.

In surface finishing alone, die casting shows a great advantage. With a sand casting, for example, the choice would have to lie between leaving the housing rough and thereby losing eye appeal or finishing all over by grinding and sanding prior to painting. These operations would add materially to the cost of the finished unit.

Cast in-place steel studs...



CUT COST 30%

with plaster mold castings by Universal

The key to the accuracy of this soldering fixtxure is the four studs whose lugs hold the work securely. The two lower ones are cast as integral parts of the aluminum plate. The top two are positioned in the plaster mold and cast in-place. *All four are cast within .005 of their true positions.* This precision work was delivered at a saving of 30% over former fabricating method: casting the steel studs in-place eliminated drilling holes, assembling and aligning the studs; cast-in holes for hold-down screws and pivot screw saved secondary operations.

This is just one example of the way Universal plaster mold castings can meet your product standards and save you money doing it.

• *Write today for your free copy of illustrated brochure — P-152.*

UNIVERSAL CASTINGS CORP.

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WALTER E. SICHA GETS AFS AWARD

One of metal-workings' highest honors was presented May 12 to Walter E. Sicha, chief of the Cleveland Research Division of Aluminum Company of America, by the American Foundrymen's Society.

Mr. Sicha was awarded the Wm. H. McFadden Gold Medal at the Annual Banquet held as a part of the Society's 58th Annual Convention.

The Alcoa scientist was cited in the award "for extensive and valuable work on light metal casting alloys and for outstanding contribution to the Society."

Mr. Sicha has been chief of the Cleveland Research Division of Aluminum Research Laboratories since 1950.

Here Are

10 Basic Facts To Help You In Buying Friction Materials

BASIC data specifications or design properties for metallic friction materials are, at the present state of the art, almost impossible. Because the frictional and other properties useful in design depend to a large extent upon testing methods, there must be some standardization in testing before evaluation of different materials can be made.

Up to the present time there has been no such standardization of testing procedures so that the publication of design information of any value is impossible unless detailed testing methods are given with each set of data; obviously this is impractical.

There are, however, some basic facts concerning the application of metallic friction materials which the user or potential user should supply to the manufacturer when he requests information or bids.

It cannot be emphasized too strongly that, at the present time, nothing can replace consultation between the user and the producer. The time between a request and a firm bid can, however, be considerably shortened if the information listed at the right is supplied to the fabricator of the friction materials.

1. Give a sketch or drawing of the proposed application.
2. Give torque requirements.
3. Give pressure to be used against the friction surfaces.
4. Indicate whether the job is to be run dry or in oil. If dry the friction surfaces must be kept completely free of lubricant if uniform results are to be achieved.
5. For engaging-disengaging applications, the speed in RPM at the time of engagement and the cycle of operation should be specified.
6. For torque-limiting applications, the time of slip and cycle of operation should be given.
7. Give the temperature range over which the unit must operate.
8. If not shown in the drawings, give any dimensional requirements or limitations.
9. For torque limiting applications, give the permissable torque variations..
10. Give sufficient information to indicate whether low rate of wear, smoothness of operation or highest possible coefficient of friction are of prime importance. Where a compromise must be reached, indicate which of these factors are imperative or most important.

With this design information it is generally possible to make proper recommendations. However, all of these data should be submitted to the fabricator before the design is frozen since slight, permissable variations can mean the difference between successful and unsuccessful, economic or uneconomic applications of metallic friction materials.

THE PROCESS: Patterns, machined from brass, are placed in flasks to form cope and drag sections . . .

PLASTER IS POURED into the flasks to produce the mold halves. The molds set quickly and are removed from the flasks . . .

MOLDS ARE DRIED to prepare for receiving molten metal. Inherent porosity makes the molds self-venting . . .

The Plaster Mold Casting

WHAT IT IS Gypsum plaster, when mixed with water in proper proportions, soon hardens into a light, firm, porous mass that assumes the shape of the surface against which it is applied.

This material is used, either alone or in combination with other materials, to form the molds into which molten metal is poured. The most common techniques for plaster mold casting involve standard cope and drag sections similar to those used in sand casting, except that the plaster mold material is smoother and more accurate.

Individual plaster mold methods differ principally in degree of mechanization, method of removing excess water from the mold, and the additional materials used with the plaster.

In making a plaster mold casting, the two mold halves are placed together with the appropriate cores set into the core prints. Molten metal is poured into the mold and allowed to chill slowly. Permeability, one of the prime advantages of the gypsum plaster mold material, permits gases to escape through the mold walls to give essentially non-porous castings.

The plaster molds are expendable, being destroyed wtih each casting cycle. The gate of castings is removed from the mold, cleaned and sawed apart.

WHEN TO USE IT Plaster mold casting fills an important place in the list of casting processes, supplying highly accurate castings with initial tooling costs little higher than those of the inaccurate sand casting process.

Quantity of parts required will also affect the decision to use this process. Even with mechanization, cycles are somewhat slower than casting processes using permanent types of molds, and the process is therefore most generally introduced for intermediate quantities of parts.

However, specific design features, such as the ability to core undercut internal cavities, within close dimensional tolerances will also be an important reason for using plaster mold casting.

Although the process is principally applied for the production of small to medium sized castings in non-ferrous metals, certain techniques involving the use of gypsum plaster have been developed permitting this process for making pieces several feet in diameter.

COPE AND DRAG sections are placed together, with cores set into the core prints. Molds are now ready for casting . . .

POURING IS DONE by gravity, and metal is allowed to chill slowly for optimum grain structure. Only non-ferrous alloys are cast . . .

GATE OF CASTINGS is removed from the plaster mold by breaking the mold. Castings are cleaned and sawed from gate.

Process

ONE OF A SERIES OF BASIC FACTS ABOUT THE PMM PROCESSES FOR DESIGNERS & BUYERS

ADVANTAGES High accuracy, smooth surface finish and sound metallurgical structure are among the prime advantages of plaster mold castings. Tolerances of .005 to .010 on one side of the parting line are in regular commercial production; closer tolerances can sometimes be held, although these should only be specified after consultation with the casting supplier.

The smooth surface of the plaster mold, plus the self-venting characteristics of the mold material, are largely responsible for the other two advantages. A plaster mold slurry, in setting, reproduces every minute detail of the pattern surface. Since patterns used in plaster mold casting are usually made of brass, and since there is no wear on the pattern surfaces, the patterns remain accurate indefinitely.

Transverse holes and passages having varying section can be produced in plaster mold casting, even those where the cross sectional area of the hole is greater in the interior of the casting than at the exterior surface.

Limitations on the shape of part that can be cast are considerably less than those on parts cast in permanent types of molds. Since the cores and mold halves are all destroyed in the process, undercuts or irregular shapes can be made that are not possible with a straight core pull.

Thin wall sections, blind holes, square or irregularly shaped holes, gear teeth, cam surfaces are all readily produced by plaster mold casting.

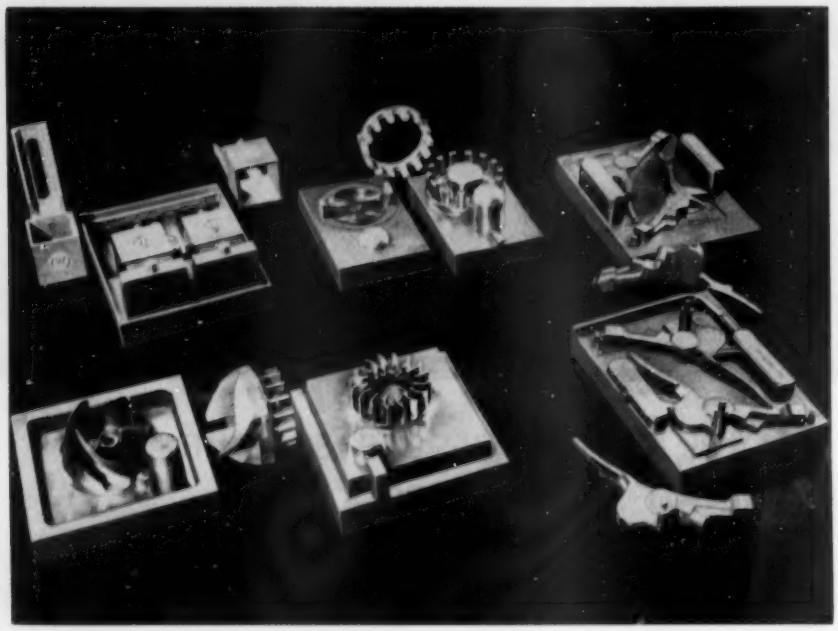
Draft on exterior, vertical surfaces is not normally required; draft on small, internal holes can be as little as .004 to .005 per side. Here again, advice of the casting supplier is needed in specific instances.

METALS Almost any combination of copper, tin, lead and zinc that has a lead content no higher than three percent and a pouring temperature under 2300 F can be cast in plaster.

Currently in production are yellow brass, aluminum bronze, manganese bronze, aluminum, nickel silver and beryllium copper. Physical properties ranging up to 100,000 psi tensile strength in a manganese bronze alloy and elongation up to 12 percent in two inches in yellow brass, can be obtained.

EXAMPLES OF PLASTER MOLD CASTINGS

Choice of Metals Available Gives Wide Range of Properties



PATTERNS AND CASTINGS produced from them are displayed here. These patterns are made in standard sizes so that they can be grouped simultaneously, thus saving a great deal in casting costs.

The Plaster Mold Casting Process — cont.

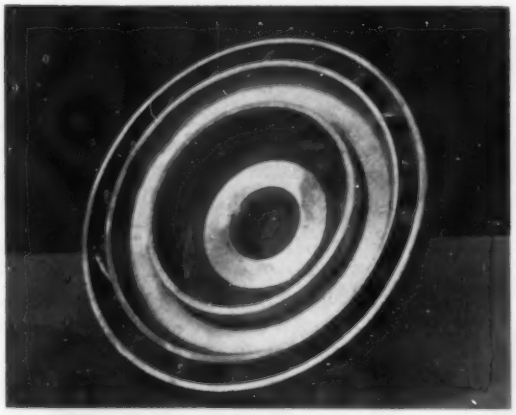
COST Plaster mold castings are essentially finished or semi-finished components as cast. They are likely to cost less than similar pieces that require machining or assembly operations to achieve the dimensions, shapes or surface finish produced by casting.

Initial investment in tools is lower than most other casting processes. Castings, being sold by the piece, have a cost that reflects not only the complexity of the piece, but also the number and shape of cores, the number of units that can be grouped in a single flask, weight of the casting, type of alloy and quantity called for on each production run.

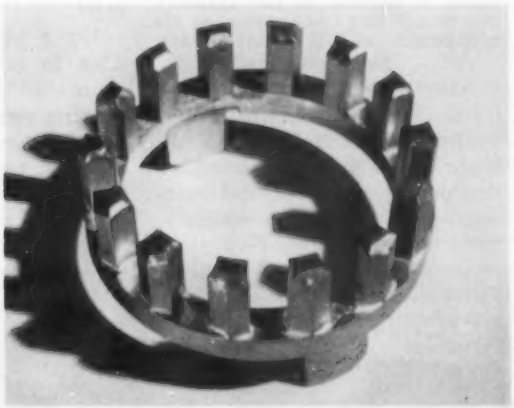
APPLICATIONS Among the products now produced using plaster mold components are burglar-proof locks, pump parts, automotive torque converters, food processing machinery, business machine parts, brush holders, marine equipment, aircraft fittings, molds for rubber, impellers, sewing machines, special machinery, railroad fittings, supercharger inducers, guided missile components, radar "plumbing", automatic transmission oil control valves and diffusers.

Plaster mold castings are currently employed in many important structural assemblies where high tensile properties, pressure tightness or good yield strength are required. In fact, these properties account for many uses of plaster mold castings in addition to those resulting from economic advantage.

Typical Plaster Mold Castings Now In Production



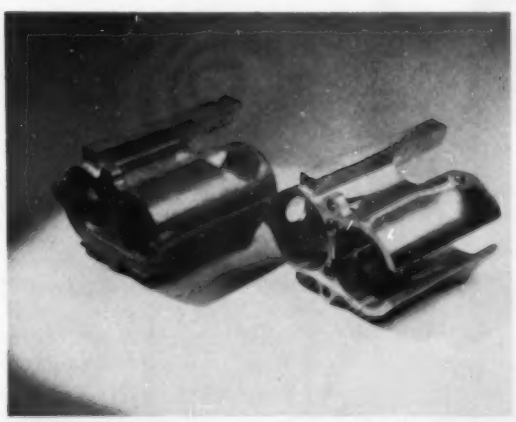
TORQUE CONVERTER requires thin fins with air foil shape. Eighteen cores are used.



BEARING CAGE calls for accurate, smooth surfaces in a complex casting.

TEA BAGGING machine has many of these small castings. Very little machining is needed.

ALUMINUM HOUSING has deep undercut in interior section and accurate hole alignment.



NICKEL SILVER castings go into a bottle capping machine where sanitary requirements are high.

GUIDED MISSILE fuel pump casting weighs 9½ lbs. in aluminum.

Veteran Die Caster Retires; Connected With Industry For 42 Years

A veteran die caster completes 42 years of service to the industry this month and has announced his retirement.

After graduating in 1912 from Stevens Institute of Technology at Hoboken, N. J., Marc Stern was fascinated by the potentialities of die castings, then an infant industry, and elected to make it his life work.

He contributed many articles to technical periodicals, presented papers before engineering societies and his treatise "Die Casting Practice" was the first text book written on the subject. His pioneering contributions were an important factor in developing the process of die castings and die casting machines of his design are successfully operating in various plants in this country and abroad.

Mr. Stern was connected for 13 years with the Doehler Die Casting Co., serving as its chief engineer before joining in 1925 the AC Spark Plug Division of General Motors Corp., He established the die casting department at AC where the range of castings vary from a speedometer part weighing less than one-thousandth part of a pound and cast to extremely close tolerances,

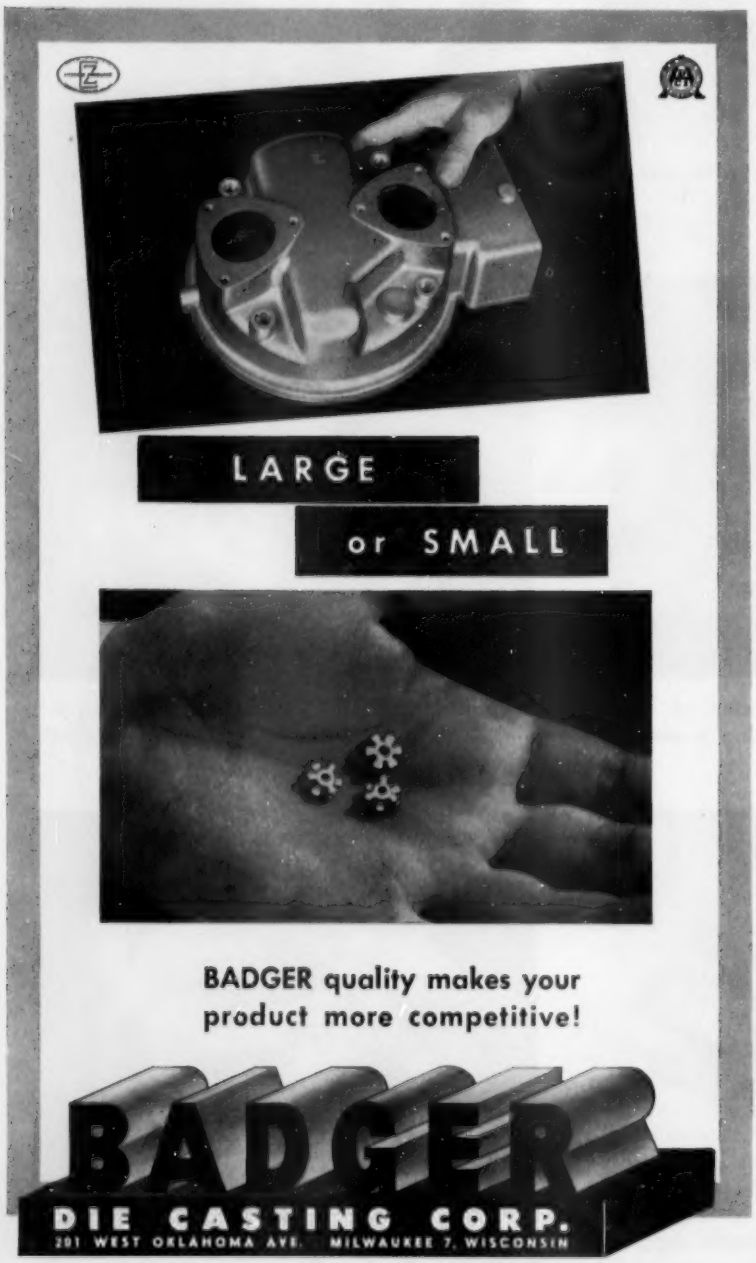
Marc Stern

as compared with an automobile instrument board panel four feet in length, each weighing a dozen or more pounds. AC consumes two million pounds of zinc per month and almost a tenth as much aluminum.

On April 1 Mr. Stern completed his 29th year with the AC organization and is now retiring from active business to devote more time to travel and recreation. He hopes to do a limited amount of consulting work so that the transition from work to play is made as gradual as possible.

TAMMS EXPANDS SERVICE IN CALIFORNIA

Tamms Industries, Inc. of Chicago have appointed the S. L. Abbot Company to represent them in the San Francisco and Northern California areas. For many years the Abbot company has represented Tamms in Southern California.



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Lively Interest In Uses For Metal Powders Shown By 800 Attending Annual Meetings

Paul Weingart New Head For Metal Powder Association

Marking the celebration of their Tenth Anniversary, the members of the Metal Powder Association meeting at The Drake Hotel, Chicago, Ill., elected officers and directors for 1954-55:

Paul E. Weingart, American Metal Co., Ltd., was elected president of the Association succeeding T. R. Moore, assistant to the vice president of General Dyestuff Corp.;

William E. Cairnes, president Radio Cores, Inc., a vice president of the Association and head of the Electronic Core Division, was elected chairman of the board;

Robert L. Ziegfeld, secretary-treasurer of the Association, was re-elected;

Morris Boorky, president, The Presmet Co., was elected head of the Fabricators Division and vice president of the Association; Mr. Weingart was elected head of the Powder Producers Division;

Carl Johnson, vice president, The Pressmet Co., and Ralph B. Quelos, general sales manager, Chemicals-Pigments-Metal Division, Glidden Co., were both newly elected directors.

The balance of the Board of Directors consists of George Roberts, vice president, Vanadium Alloys Steel Co.; Fred Lux, president, Lux Clock Manufacturing Co.; B. T. duPont, sales manager, Plastics Metals Division, National Radiator Co.; Harrison Stackpole, vice president of Stackpole Carbon Co.

The Board of Directors announced that the next annual meeting of the Association, which is open to the entire metal powder industry, and the 1955 Metal Powder Show, will take place in Philadelphia May 10-12, 1955.

The next meeting of the Association, which will be restricted to members, is scheduled for The Homestead, Hot Springs, Va., September 10-12, 1954.

GROWTH OF METAL POWDER INDUSTRY REPORTED BY M. P. A. OFFICERS

"There is no indication of any slowing down in the growth of the metal powder industry," declared Paul E. Weingart, newly elected president of the Metal Powder Association. Speaking at the tenth annual meeting of the Association, Mr. Weingart said that "the phenomenal growth of this industry which about 25 years ago could boast not much more than 50 concerns who were interested in powder metallurgy, is reflected in the rapid growth of the Metal Powder Association, plus the fact that attendance at this three-day meeting numbered between 700 and 800 individuals".

"Today, organizations interested in this art approach 1,000 and number among them some of the nation's largest industrial corporations. These companies include the producers of metal powders, the manufacturers of self-lubricating bearings, gears, cams

continued next page

Some of the new directors and officers of the Metal Powder Association are shown here. They are, l to r, Ralph B. Quelos, Glidden Co.; B. T. du Pont, Plastic Metals Div., National Radiator Co.; Robert L. Ziegfield, secretary-treasurer, Metal Powder Association; William E. Cairnes Radio Cores, Inc.; George A. Roberts, Vanadium-Alloys Steel Co.; and Paul E. Weingart, American Metal Co., Ltd.

Growing Use of Metal Powders Reported — cont.

and other mechanical parts, metallic friction materials, electronic cores, magnets, etc. plus a constantly growing list of users of these products."

The size of the Metal Powder Association, Mr. Weingart pointed out, has more than quadrupled since its founding only ten years ago. Today there are 62 companies who belong to the Association.

Iron Cores: War To Peace

"The use of iron cores during the last war allowed our military forces to have finer — smaller — more stable, and trouble-free communication equipment," said William E. Cairnes, newly elected chairman of the board of directors of the M. P. A. Since then, they have been almost universally adopted in every auto radio, home radio, clock radio, television and color television receiver.

Today, for the first time the electronic core manufacturers, coil manufacturers, receiver manufacturers and coil form manufacturers met to discuss problems of mutual concern. This pioneering step was accomplished at a full day special session at the annual M. P. A. meeting.

The program of standardization adopted by the Association's Electronic Core Division headed by Mr. Cairnes is aimed at reducing costs of these vital components to radio and television set manufacturers and, ultimately, it is hoped to reduce costs for the ultimate consumer.

Better methods, freedom of mechanical and electrical difficulties and standardization are all leading toward these reductions and improvements in performance".

Speaking for the industry in general, Robert L. Ziegfeld, secretary of the Association, said, "Unusual interest has been shown by the engineering fraternity and businessmen in general in the Metal Powder Show, where the products of metallurgy were on display, as well as in the papers presented at the technical sessions."

One reason for this, Mr. Ziegfeld felt, could be attributed to the fact that our economy is in a state of flux and is entering a more keenly competitive era. He elaborated, by citing evidence, that the products of powder metallurgy are in a much better competitive position today than metal products formed by other techniques.

Metal powder parts possess the inherent advantages of lower production costs, better mechanical characteristics, no scrap loss, improved dimensional tolerances, and other characteristics unique to powder metallurgy, such as controllable porosity, self-lubrication and others."

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PERFORMANCE
with others when you need
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For superior design, better appearance and greater strength . . . select PARAGON Die Castings. They are everything the name implies.
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QUESTIONS from the floor provided some of the liveliest moments at the ICI meetings. A panel of experts presented technical papers to start the discussions.

ANSWERS to specific problems were offered by several experts. Shown above is Dr. Nicholas Grant of M. I. T., consultant for the Institute, commenting on a question from the floor.

SALES and production were subjects of panel discussion. V. S. Lazzara and James Coley, participants in the program, are shown at the left.

KEYNOTE speech was given by Frank Howard, Sr., shown at right with ICI president K. M. Bartlett and Roger Waindle.

Technical Discussions Featured As Investment Casting Institute Meets

A LARGE and enthusiastic group participated in the first full scale membership meeting of the Investment Casting Institute May 6 at Cleveland's Hotel Carter.

Close attention was given by the 77 industry representatives who were present for the day-long meetings. Discussion of some of the industry's important technical problems occupied the morning sessions, while sales and marketing considerations were taken up in the afternoon.

Keynot speaker was Frank Howard, Sr., president of Howard Foundry Co., who devoted his address, "Opportunities Unlimited," to a discussion of the need for educating industry on the advantages and uses of investment castings.

Mr. Howard pointed out that 80 percent of the investment casting industry's present work is military, since that military procurement program was responsble for early growth of the industry.

However, he also indicated the need for diversification in the industrial field where he foresaw a potential use of investment castings at least equal in volume to the peak military market for these castings.

Results of studies of the relationship between mold and metal temperatures and casting quality were discussed by Dr. Nicholas Grant, associate professor of metallurgy, M. I.

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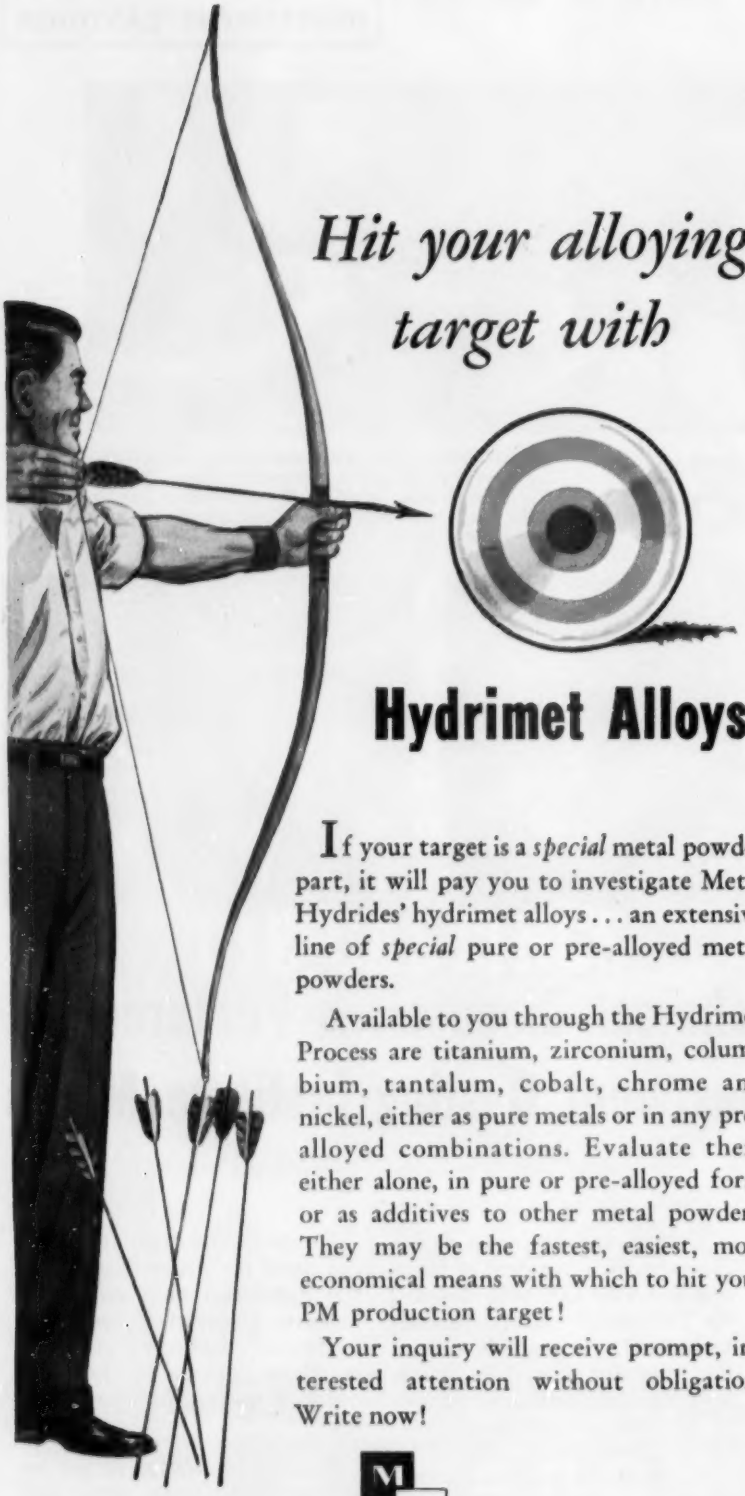

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T., who illustrated his presentation with examples of nvestment castings produced under varying conditions.

James Coley of Ajax Electrothermic Corp. outlined the features and advantages of induction melting for ferrous and non-ferrous alloys in investment casting.

Roger Waindle of Wai-Met Engineering Co. discussed ways and means of controlling melting of alloys for improved casting quality. All of these papers will later be available to ICI members when transcriptions have been completed.

The question of where the greatest potential markets for investment casting are was discussed by W. I. Matthes of Arwood Precision Casting Co., who reported on the industrial market, and Ted Operhall of Misco Precision Casting Company whose topic was selling the defense industries. V. S. Lazzara of Casting Engineers, Inc., was moderator of the sales panel.

In preliminary business sessions, reports were heard from chairmen of two committees working on technical projects. Herbert Kuebrich, chairman of the Inspection and Standard Qualty Practice Committee, and Charles Yaker, chairman of the Materials Specifications Committee, told ICI members of the program each committee had set up and the plans to accomplish these objectives.

Two social events were held in connection with the meetings: a fellowship dinner the evening before, and a luncheon midway of the May 6 sessions.

Next on the agenda is another meeting of the entire Institute to be held in November. Date and place will be announced later. By that time, results of two industry questionnaires are expected to be completed.

Finishing Section

SURFACE FINISHING

Most precision metal molded parts receive some type of surface finish such as plating, organic coating, anodic coating, or chemical coating. This section includes information on the methods, processes and equipment used in these surface treatments.

A Section Devoted to Specialized Finishing of

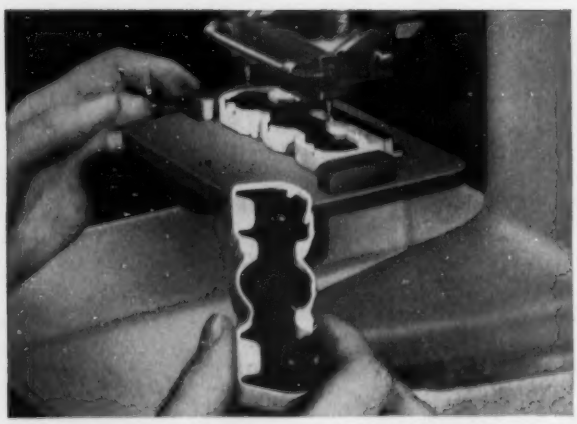
Die Castings • Investment Castings • Powder Metal Parts
Permanent Mold Castings • Plaster Mold Castings

Why stop AUTOMATION at Assembly?

Progress toward automation* does not end where assembly begins for manufacturers who take full advantage of the P-K Fastening Method. They *eliminate* manual operations like tapping, nut-running, inserts in plastic — and avoid the attendant trouble and expense. Automatic screw driving equipment can be used to further mechanize hand operations on many applications. Assembly savings run up to 50% and more.

Complete automation is, for most, a *distant* dream. Meanwhile, assembly *hands* control your fastening costs. Find out how P-K Self-tapping Screws can *double* — *even triple* — their efficiency. It *pays* — and pays well — *today*. Talk to a P-K Assembly Engineer. Parker-Kalon Division, General American Transportation Corporation, 200 Varick St., New York 14.

**Successive elimination of manual operations*



AUTOMATIC DRIVING adds *extra* speed to the faster P-K Fastening Method. Here, an automatic, double-spindle, hopper-fed machine is being used for driving two P-K Type U Drive Screws simultaneously in a plastic electric outlet. Single or multiple spindle machines are available from several manufacturers.

MAYTAG ASSEMBLY MOVES FASTER because fastenings made with P-K Self-tapping Screws are simpler, easier, dependably secure. In the Maytag Dryer shown, 80 Type A and 46 Hex Head Type Z are used, in all, for fastening sheets from 24 to 11 gage — driven with air-operated tools.

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The Original **SELF-TAPPING SCREWS**

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Two types of semi-automatic machines

1. SPINNER TYPE which rotates the part during painting. The spray guns may be fixed or mounted so as to oscillate while painting.

2. STATIONARY TYPE in which the part is held in one position, although spray guns may be mechanically moved to obtain better paint coverage. Rapid oscillation of gun gives most even coat of paint.

You Can Get

Faster Paint Spraying With Mechanized Equipment

BY C. W. SCANTLEBURY, Engineer
Finish Engineering Co., Inc.

THERE have been more improvements in the mechanization of painting die castings during the past two years than in the previous 30 years — and new techniques are being perfected in rapid succession.

While die castings have been finished by spray painting for many years, and painting through spray masks or stencils is established practice, only recently have these methods been successfully mechanized.

The most important advance has been the development of machines which mask and spray the casting when the part is put into a holder.

Fully automatic machines — These require only the loading of parts — then the machine sprays as high as four or more colors, cleans the paint-clogged masks, and unloads — all automatically. These machines are ideal for high production painting of parts, at a steady production rate, with one operator, up to 2,000 pieces per hour. The initial cost of the machine, and cost of tooling, are justified by minimum cost of painting parts in large volume.

Semi-Automatic machines — These eliminate one of the most time-consuming operations by spraying automatically, but the parts are manually unloaded from the mask. And the mask must be removed for cleaning when it becomes clogged with paint.

For the general run of parts which are produced with frequent change-over, the semi-automatic machines are more practical — and so are widely used for runs of 10,000 to 50,000 pieces, and also on high production runs. Semi-automatics are set up for a new job merely by changing masks, and in some cases position of the spray guns. The length of time the spray guns stay on, speed of rotation, air pressures etc., are set by dial controls. The two types of semi-automatic machines, illustrated in

continued next page

Automatic Wiping Speeds Finishing Operations

Figures 1 and 2, are stationary and spinner types.

Stationary type machines have been most widely used in the past, but recent development of the spinner machine has made them more versatile than the stationary type — few parts are cast which cannot be painted advantageously by the spinner technique. Parts one inch in diameter to large block-shaped castings measuring approximately 3" x 6" (See Figure 3) are painted on standard size machines. Special machines can be made for any size casting.

Figure 5 shows a variety of castings sprayed at high production rates on spinner type machines; production rates of 1,000 or 1,200 pieces per hour are common.

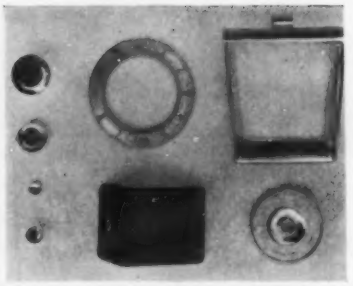
The stationary type semi-automatic machine operates like the spinner type except that the part does not rotate. It is just as effective as the Spinner when rotation is not required, and its spray masks cost less because they need not be mounted exact center on a spindle.

Automatic Wiping is another time-saving development.

The established method of decorating depressed letters, number and lines is by filling and then wiping. In the past, paint was simply daubed on with a brush and the excess wiped off with a cloth or tissue. This method was improved by spraying through a "Block Cut" mask that confines the paint to the immediate area around the lettering or decoration, then wiping off the excess as before. In many instances the wiping required as much as a minute per piece, with careful inspection necessary to assure acceptable parts.

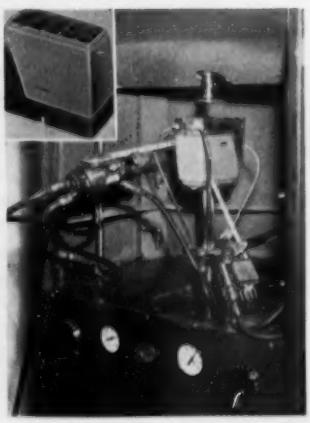
Within the past year a machine, Figure 6, has been developed which does the wiping automatically. The part, held in a workholder, is thrust up-

continued on page 71



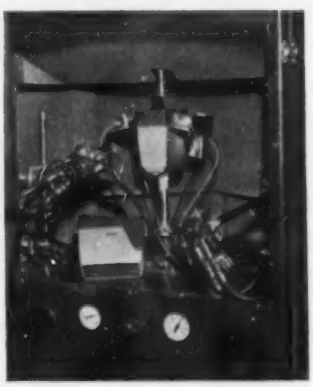
5. HIGH PRODUCTION RATES are attained in spraying these die castings on spinner type machines. Note the variety of shapes and sizes.

How to Paint a Two-Tone Wrinkle . . .

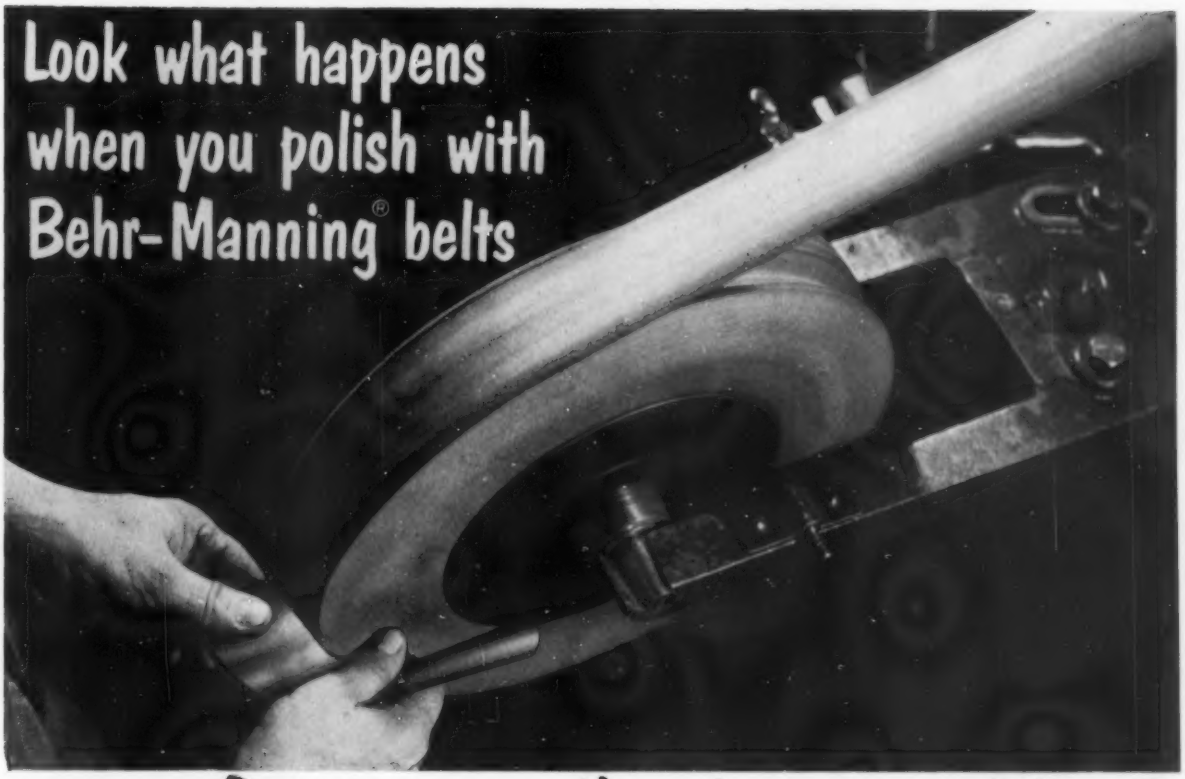


3. CASTING (inset) is painted two-tone. The first coat is a wrinkle finish which is sprayed on all exterior surfaces, and for this operation no mask is used — the part is simply placed on a holder mounted on the lower spindle. Pressing the foot valve sets the machine in motion; it rotates and sprays the part, then stops automatically after a timed cycle. The spindle always stops in the same position, for easy loading of parts. An oscillating gun mount moves the gun rapidly back and forth, which is essential for the uniformity needed to get an even "wrinkle".

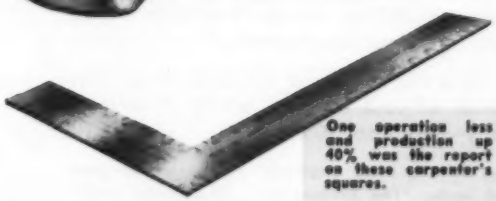
4. AFTER THE WRINKLE coat is baked, the Spinner machine is again used to get the two-tone effect, by using a mask and lighter shade of paint. The mask is "clam" type, and opens and closes automatically. A part is inserted in the open mask, the foot valve is pressed, the mask automatically closes on the part, and immediately rotation and spraying take place. When rotation stops the mask opens automatically.



Look what happens when you polish with Behr-Manning® belts



More production at less cost was the story of finer finish on golf club irons.



One operation less and production up 40% was the report on these carpenter's squares.

Finishing O. D. surfaces of fountain pen barrels was converted to automatic feed.

How about your polishing?

Flexible, evenly-coated BEHR-MANNING Abrasive Belts can polish your toughest contours, produce superior finishes and slash production time. Bring your parts to a nearby BEHR-MANNING Demonstration Room and see for yourself. Make a date now. Behr-Manning Corp., Troy, N. Y., Dept. PR-6.

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Belt method licked contour polishing on these forged steel wrenches.

Brass plumbing fixtures took plating better after belt finishing was installed.

Roughing and fining out were simplified for these brass hardware fixtures.

Weld marks on bumper guards were quickly roughed and blended with belts.

P-1

For the newest in coated abrasives.. watch BEHR-MANNING

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A drill press makes money only when the tool is cutting. Each second the spindle stands idle is a dead load on overhead.

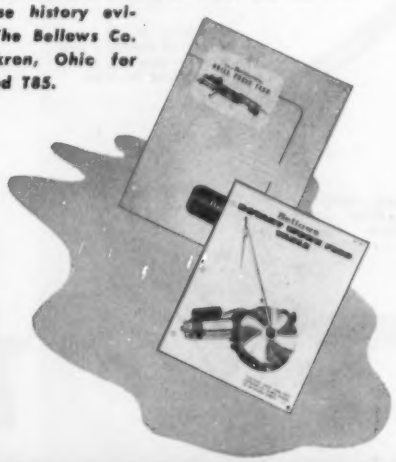
Unfortunately, actual machining time in drilling, tapping, reaming or counterboring is pretty well fixed by the nature of the tool and material.

But the time taken in getting the tool to and from the material and the material to and from the tool is pretty much up to the ingenuity of the tool engineer. It's here that costs can be cut — added profits made.

It's here that two Bellows "Controlled-Air-Power" Devices can fit into your picture: The Bellows Drill Press Feed and the Bellows Rotary Work Feeder. The Bellows Drill Press Feed attaches to the star wheel shaft of any standard drill press. A touch on the operating lever and the Feed advances the quill rapidly to the work, feeds the tool under hydraulic control through the work — and returns the quill quickly to starting position. The Bellows Rotary Work Feeder feeds the parts swiftly, accurately and safely to the tool. All the operator has to do is load and unload — the rest is automatic.

Cost reductions can be almost fantastic. In our files are hundreds of case histories telling of savings ranging anywhere from 30% to 80%.

Phone your Bellows Field Engineer. He's listed in your phone book under "The Bellows Co". (In Canada, under Bellows Pneumatic Devices of Canada, Ltd.) Ask him to show you the case history evidence. Or write The Bellows Co. Dept. PMM-654, Akron, Ohio for Bulletins DF110 and T85.



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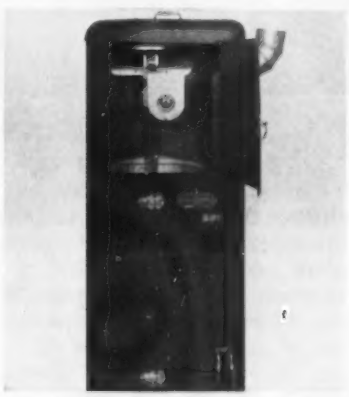
Washing Spray Masks Manually Is Wasteful

ward to contact the towel, which is pushed against a wiping mandrel that fits the contours of the wiped surface.

While in contact with the towel and mandrel, the part is rotated or oscillated until wiped clean. The 150 yard roll of towel indexes automatically to a clean spot with each stroke of the machine. It may be used dry or wet with solvent depending upon the paint used. When dirty, the towel is washed and re-used. Production increases over hand methods have been phenominal, particularly with parts which are difficult to hand-wipe; rates from 1,000 to 1,500 pieces per hour are being achieved in production.

6. MECHANIZED WIPING of excess paint is a recent development. This unit wipes up to 1,500 pieces per hour.



7. TIME WASTED in manual washing of paint spray masks is another item that can now be avoided with automatic mask washers at each booth. All photos courtesy Finish Engineering Corp.

Mask Washing As the washing of paint-clogged spray masks consumes a great deal of time when done by hand methods, there is no other operation that can be mechanized more profitably.

Careful studies in finishing shops have shown that 30 to 40 percent of the total spraying effort was spent in hand brushing to clean masks. By installing a small automatic mask washer at each booth, the time for washing was cut to 5 to 10 percent of the total spray effort. A mechanical mask washer is shown in Figure 7, this is the small size washer, intended for cleaning spray masks up to 12" x 15". Time studies have shown that an automatic washer for each spray operator is more efficient than a large washer servicing a number of operators.

To sum up: Mechanization of finishing operations is proceeding at a rapidly accelerating rate. The latest machines have made spray painting so low in cost that it is now practicable to use this method of decoration on a far wider range of products.

ZINC PLATE
and
LUSTER-ON®

CUT METAL COSTS
Luster-on passivating dip added to *zinc* costs less than cadmium, copper-nickel-chrome or any other finish available today.

CUT TIME COSTS
Luster-on is applied in one quick cold dip, manually or automatically, usually saving ⅔ of the processing time of flash copper, nickel and chrome work. You know time costs money. Save both with Luster-on.

CUT POWER COSTS
You save on power used and rectifier and generator equipment required because zinc plate and Luster-on need no heavy power to plate compared to copper, nickel and chrome.

' ' '

That's the 1-2-3 of it. While you save money with Luster-on you still can be *sure* of a uniform, corrosion-resistant, brilliant finish.

And if a bright scratch-free surface is important, you should investigate Luster-on Zinc-Chrome.

Start now TO SAVE MONEY WITH LUSTER-ON — the first in the field, and still the leader.

Write for free data sheets and send a part for free processing.

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SHEETS

ALOXITE® Metal Cloth sheets are remarkably flexible, easy to work with...even on contours and sharp corners. Packed in handy sleeves. Available in all grit sizes from 24 through 500.

YOU CAN REALLY SAVE MONEY on light maintenance and touch-up work...and on many production jobs involving roughing, blending, finishing or polishing...with ALOXITE® Metal Cloth Sheets and ECONOMY® Rolls by CARBORUNDUM. They cost so little—do so much! Order an assortment of grit sizes in both the rolls and sheets. Keep a supply at every workbench and near every metal-working machine. Your operators will find dozens of uses for them—and each use will save production time—and money. STOCK UP TODAY!

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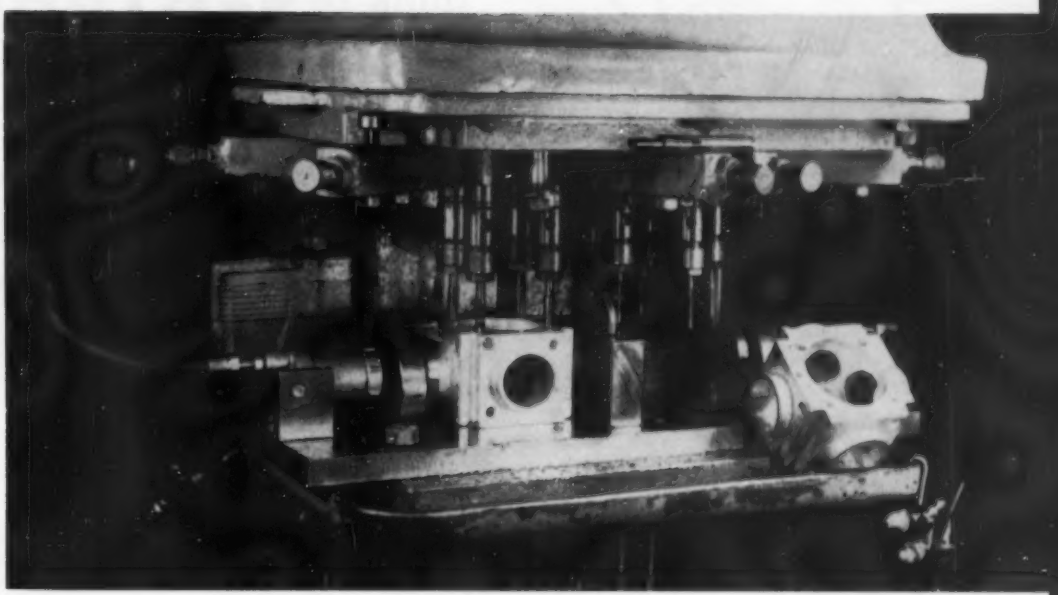
Air-Operated Fixture Saves 60 % In Tapping Die Castings



"WORKING on air" for machining and assembling metal products is cutting down on worker fatigue and increasing output for British industry.

What is . . . "working on air"? It is simply the introduction of air-operated jigs, chucks and fixtures for holding, feeding or processing workpieces.

At Victor Products (Wallsend) Ltd., every fixture in the machine shop and assembly section has been adapted to compressed air, and all chucking machines with short operation cycles have been equipped with air chucks.

An air-operated vise, in one operation, has replaced the hand-operated holding mechanism on a milling machine to save 95 percent of the clamping time.

In another instance, an air cylinder adapted to a collet type fixture used in conjunction with a slitting and milling machine has cut the time from four minutes to one minute. The collet is opened and closed by a wedge attached to the piston of the air cylinder, operating between rollers.

An adaptation to a two-station tapping fixture, above, has simplified the operation of tapping eight holes in a zinc die casting. The component is now held in place by the piston of an air cylinder which is actuated when the table of the machine is raised to the tapping position.

The actuating valve is fitted beneath the table and operated in the normal way by a cam. Time saved — 60 percent.

Fitting a spring ring and placing two grub screws into an electrical contact tube is another operation speeded up by the application of compressed air.

A fixture to take the contact tube was fitted to a bench. The tube is lined up with two holes in the top plate. Next the two grub screws are dropped into position and driven home by pneumatic screwdriver.

At one end of the fixture is a large plunger from which a second tapered plunger protrudes. The spring ring is placed on the tapered plunger. A foot pedal under the bench is operated and compressed air forces the main and tapered plungers forward, expanding the spring ring.

The forward movement continues until the taper plunger has reached the end of the tube. This plunger, which is spring-loaded, then stops, and the main plunger forces the spring ring into position in the groove of the contact tube. The saving in operating time is 85 percent.

when you THINK of FASTENERS think of CENTRAL...

CENTRAL MAKES EVERY TYPE FOR ALL DIE-CASTING ASSEMBLIES!

TYPE "1" THREAD CUTTING

Better for metal where a thread cutting action supercedes thread forming. Type "1" Central Thread Cutting Screws drive with minimum torque to form a perfectly mated thread and a tight fit. Interchangeable with standard machine screws.

TYPE "23" THREAD CUTTING

Note the wide thread cutting slot that works better in softer metals such as aluminum and zinc, or in harder metals where the wide slot affords better cutting advantages.

TYPE "25" THREAD CUTTING

Here the exclusive wide flute cutting slot combines with a specially spaced thread for low driving torque, high resistance to stripping and extra-free cutting action. Ideally suited to soft metals and plastics. Write for full details.

DRIVE SCREW TYPE "U"

TYPE "A" TAPPING SCREWS

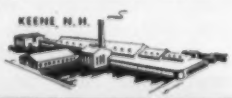
Pointed and augur-like, the Central Type "A" Tapping screw pulls and forms thinner (.015" to .050") sheets of metal into a matching threaded section from punched, drilled, or nested holes. Available with slotted, Phillips, clutch or hexagon heads.

TYPE "B" TAPPING SCREWS

Die-pointed and augur-like for thicker metal (.050" to .200"), Central Type "B" Tapping Screws pass through a hole in one piece, form their own threads to lock both parts securely. For porous castings, non-brittle plastics, fibre and asbestos materials.

TYPE "C" TAPPING SCREWS

Recommended for general use in metals from .030" to .100" thickness. Standard pitch thread interchangeable with standard machine screws. Ideal for chip-free assemblies. Second assemblies can be made on projected end of the screw.



1914 • 1954
SERVING INDUSTRY MORE THAN 40 YEARS

"You Can Depend on Central"

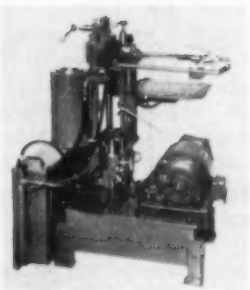
CENTRAL SCREW COMPANY

3501 SHIELDS AVE., CHICAGO 9, ILLINOIS

3028 E. ELEVENTH ST., LOS ANGELES 23, CALIF. • 149 EMERALD ST., KEENE, N. H.

For additional information Circle No. 81 on the Reader Service Card

New Products ... the Reader Service Cards will bring full details



WAX INJECTION MACHINE
. . . high pressure, large capacity . . .

A new wax injection machine for use in making patterns for investment casting has recently been announced.

The new machine features higher pressures, up to 1000 psi, and greater wax capacity per shot, (up to 138 cu. in.) than has been available before.

The new press has been developed from an earlier model and retains all of its basic principles. The press uses a hydraulic pressure ram to force wax from a movable cylinder through an injection nozzle at controlled temperature and pressure. Replacement of empty cylinders is easily and quickly accomplished.

Alexander Saunders & Co.
For more information circle No. 196 on the Reader Service Card

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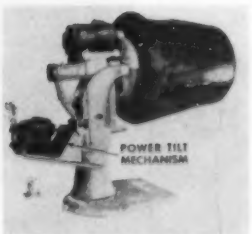

REDUCE OPERATOR FATIGUE
. . . with power tilting barrels

Uniform tumbling angles, reduced operator fatigue, 20% savings of floor space are achieved in a new line of direct drive tumbling barrels with the development of power tilting.

Said to be extremely easy to operate, the tilting mechanism is controlled by a reversing drum-type switch. The unit is designed for manual starting, with automatic shut-off at adjustable high and low limits. Use of the power tilt with direct-drive barrels eliminates the conventional handwheel. This, the manufacturer states, saves 3 sq. ft. of floor space per machine.

The power tilt device is available optionally with the direct-drive barrels at rated capacities of up to 3000 pounds. The barrels are powered by a 1/3 H. P. or a ¾ H. P. motor depending upon the unit size.

Hupp Corp., Glove Stamping Div.
For more information circle No. 197 on the Reader Service Card

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MULTIPLE MOUNTED WHEELS
. . . for greater surface coverage

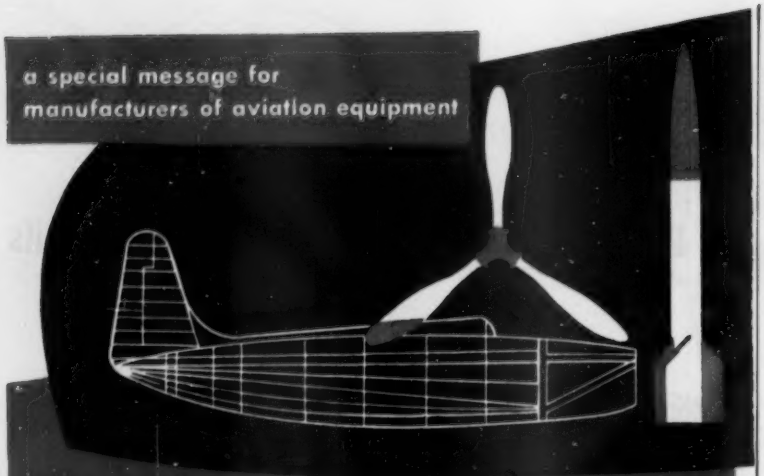
Said to provide much greater surface grinding coverage without loss of individual wheel flexibility, a new flexible grinding wheel is now available that can be built up in increments of 1" or more.

Any number of units can be assembled as a single wheel, depending only on the available arbor length. The individual wheels are light weight (approximately 7 oz.) so that for flexible shaft or portable drill use from three to five units can easily be handled.

Merit Products
For more information circle No. 198 on the Reader Service Card

continued next page

a special message for
manufacturers of aviation equipment



need a finish for
light-metal parts?

specify
IRIDITE®

Here's the finish that combines corrosion resistance and paint adherence with extreme ease of application. It can be welded or soldered with no difficulty and presents no problem in "patching" scratches, marks or scraped sections. Here's what you can do with Iridite:

ON ZINC AND CADMIUM you can get highly corrosion resistant finishes to meet any military or civilian specifications and ranging in appearance from olive drab through sparkling bright and dyed colors.

ON COPPER . . . Iridite brightens copper, keeps it tarnish-free; also lets you drastically cut the cost of copper-chrome plating by reducing the need for buffing.

ON ALUMINUM Iridite gives you a choice of natural aluminum, a golden yellow or dye colored finishes. No special racks. No high temperatures. No long immersion. Process in bulk.

ON MAGNESIUM Iridite provides a highly protective film in deepening shades of brown. No boiling, elaborate cleaning or long immersions.

AND IRIDITE IS EASY TO APPLY. Goes on at room temperature by dip, brush or spray. No electrolysis. No special equipment. No exhausts. No specially trained operators. Single dip for basic coatings. Double dip for dye colors. The protective Iridite coating is not a superimposed film, cannot flake, chip or peel.

WANT TO KNOW MORE? We'll gladly treat samples or send you complete data. Write direct or call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified phone book.

ALLIED RESEARCH PRODUCTS
INCORPORATED
4004-06 E. MONUMENT STREET • BALTIMORE 5, MD

Manufacturers of Iridite Finishes for Corrosion Protection and Paint Systems on Non-Ferrous Metals, ARP Plating Chemicals.
WEST COAST LICENSEE: L. H. Butcher Co.

For additional information Circle No. 74 on the Reader Service Card

SILICONE DIE LUBE . . . in aerosol spray

An aerosol spray silicone die lubricant is now being marketed under the trade name "No-Stick" Silicone Spray Mold Release.

Described as 100 percent pure silicone and dry freon propellant, the release is packed in safe, heavy duty 16 ounce cans, with a fast-acting self-cleaning valve.

The die lubricant comes from the spray valve in an even dry mist which is non-rusting, non-marking, non-toxic, odorless and non-flammable. Because it is undiluted silicone, more shots are obtainable between applications.

Ellen Products Co.
For more information circle No. 199 on the Reader Service Card

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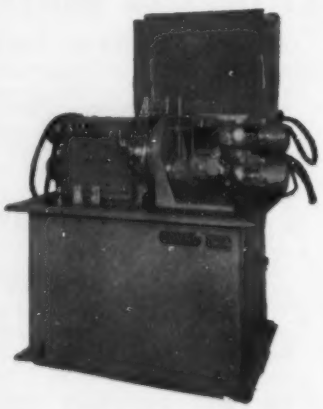
MACHINE DRILLS & REAMS . . . opposed holes in line



Higher production rate in drilling opposed holes in line is reported for this new machine that incorporates a 6-station, Geneva type indexing dial, electrically interlocked with 4 Govro-Nelson KH automatic drilling units.

The part being drilled and reamed, upon being manually loaded and clamped, is automatically drilled, reamed, unclamped and ejected.

According to the manu-

continued on page 79

Come to TUMBLE GRAV-I-FLO FINISH

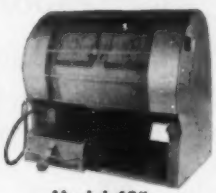
for higher lustre — smoother finish on metal parts

You can get a far superior finish on metal parts with the Super-Brite chips and compounds employed in the Grav-i-Flo Tumbling Process. Developed by originator of modern mechanical finishing, these materials also cut much faster, and eliminate the need of transferring parts from the cylinder between roughing and finishing operations. They likewise eliminate subsequent operations such as ball burnishing for color.

And, the time-saving Grav-i-Flo process for finishing and deburring cuts direct labor costs too. Hundreds of companies are getting better finishing and deburring results, faster and cheaper. If you haven't checked these advantages to your competitive position, do so today! Invite Grav-i-Flo to make recommendations.

Grav-i-Flo offers complete equipment, accessories and supplies for all your tumbling needs!

Model 66", two compartments



Model 48", two compartments

Machines. Grav-i-Flo 66", 48", 36", 32", and 24" machines have cam locked doors with manually released safety stops; available with unlined or rubber lined cylinders, constant or variable speed drive, J.I.C. controls, and timers from 5 minute to 20 hour cycles. Equipped with electric wiring and water piping installed ready for plant hook up.

Model 36", two compartments

Model 32", two compartments

Model 24", two compartments
Designed For Small Lot Production and Laboratory Processing.

Compounds. Grav-i-Flo natural and synthetic deburring and finishing chips and highly developed compounds consistently outperform every type of tumbling process offered on the market.

Investigate. Grav-i-Flo superiority in equipment and supplies has been proved to hundreds of users in many different industries. Let us show you, too, at no obligation. Our representative will visit your plant, or you may send samples direct to us. Engineering Service available to all users.

SEND FOR CATALOG showing complete line of Grav-i-Flo equipment, accessories and supplies.

Grav-i-Flo Corp., Dept. PMM-6 Sturgis, Mich.
☐ Send complete catalog. ☐ Have Sales Engineer call. ☐ We are sending samples.

Company _____

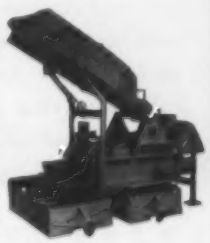
Name _____ Position _____

City _____ State _____

GRAV-I-FLO CORPORATION 400 Norwood Avenue Sturgis, Michigan

ACCESSORIES

Two deck parts-and-chips separator and chip grader.



Occupies less floor space. Separates parts quickly without impingements. Grades 3 sizes of chips simultaneously.

Other Grav-i-Flo accessories include tubular yoke hoist pans, chip pans, wash-out doors, screens, chip bins, unloading boats, dip tanks.

For additional information Circle No. 82 on the Reader Service Card

CHEMICALS ACP PROCESSES

PHOSPHATE COATINGS TO MAKE YOUR PRODUCT DURABLE*

PIONEERING RESEARCH AND DEVELOPMENT SINCE 1914

For more than a third of a century, ACP research chemists and ACP technical representatives in the field have pioneered in the science of metal preservation. They have developed surface treating chemicals which either protect metals directly, or create a superior bond for decorative and protective paint finishes, and now, ACP chemicals and processes are being used the world around to reduce costs, speed production and add to the life-span of countless products.

ACP metal protective chemicals include: protective coating chemicals for steel, zinc and aluminum; metal cleaners and rust removers; final rinse controls; pickling acid inhibitors; copper coating chemicals; soldering fluxes; alkali cleaners and addition agents; copper stripping and brightening solutions.

PAINT BONDING

"GRANODINE"® zinc phosphate coatings improve paint adhesion on automobiles, refrigerators, projectiles, rockets, and many other steel and iron fabricated units or components.

"LITHOFORM"® zinc phosphate coatings, make paint stick to galvanized iron and other zinc and cadmium surfaces.

"ALODINE"® protective coatings provide improved paint adhesion and high corrosion-resistance for aircraft and aircraft parts, awnings, wall tile, signs, bazookas, and many other products made of aluminum.

RUST PROOFING

"PERMADINE"® zinc phosphate coatings provide rust and corrosion proofing for nuts, bolts, screws, hardware, tools, guns, cartridge clips, and many other industrial and ordnance items.

PROTECTION FOR FRICTION SURFACES

"THERMOIL GRANODINE"® manganese-iron phosphate coatings provide both rust proofing and wear resistance — anti-galling, safe break-in, friction on rubbing parts.

IMPROVED DRAWING AND COLD FORMING

"GRANODRAW"® zinc phosphate coatings make possible improved drawing, cold forming and extrusion on such steel products as sheets for stamping, bumpers, parts to be formed, prior to plating or painting, cartridge cases, etc.

*Made, Sold, and Serviced By A Pioneer In Protective Coatings For Metals . . .

AMERICAN CHEMICAL PAINT COMPANY

General Offices: Ambler, Penna.

Detroit, Michigan **Niles, California** **Windsor, Ontario**

For additional information Circle No. 78 on the Reader Service Card

facturer, the machine is being used in one particular plant to drill and ream two opposed holes in an automotive part at a rate of 900 pieces per hour.

Govro-Nelson Co.

For more information circle No. 200 on the Reader Service Card

---

LINE OF SPEED REDUCERS . . . require no torque arm

Two new speed reducers rated at ¾ HP and 3 HP are now available. The smaller of the two units is available in either a 20 to 1 or 16 to 1 ratio, while the larger one is only available at present in a 15 to 1 ratio.

Both speed reducers are designed for direct shaft mounting, bolted to the frame or foot mounted.

The input shaft is ¾ inch or 1 inch alloy steel, roller bearing mounted. The out put on the smaller reducer is ¾ to 1⅛-inch bore sleeve while the companion unit has an output sleeve bore of 1 to 1-⅜".

Peerless Gear & Machine Co., Inc.

For more information circle No. 201 on the Reader Service Card

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NEW-TYPE CONTACT . . . for Daniels Barrels

A new knife switch type of contact and drive gear positioner has been developed for use with the standard OLS Daniels plating barrels which maintains positive negative contact at all times.

This new device offers the additional advantage of self-cleaning, increasing the current capacity of the entire unit and substantially raising the overall efficiency of the barrel.

This new knife switch also has a set screw mounted through it in order to maintain perfect gear mesh and alignment at all times.

Daniels Plating Barrel & Supply Co.

For more information circle No. 202 on the Reader Service Card

develops a new approach to SURFACE FINISHING

ROTO-FINISH has now extended the original barrel finishing process to include entirely new special fixture machines and equipment. These machines represent a radically new departure from the generally accepted conception of barrel finishing machines, made possible only by Roto-Finish extensive experimental facilities and long experience with modern, precision surface finishing processes. And these new special fixture machines prove that there are no limits to the size or shape of parts which can be successfully processed with proper equipment, materials and methods.

The new engineering developments which have taken place in the Roto-Finish laboratories open the door wide to entirely new applications and entirely new principles in mechanical surface finishing. Therefore, whatever your finishing problem, we urge you to ship us two finished and several unfinished samples of parts you may wish to have us process in our laboratories. Remember, Roto-Finish guarantees the same result in your shop, as on the samples processed in their laboratories.

Get this new FREE CIRCULAR

Roto-Finish COMPANY

3716 MILHAM ROAD, KALAMAZOO, MICH. P. O. Box 988 — Phone 3-5578

It's the finish that counts

For additional information Circle No. 86 on the Reader Service Card

SUPERTARTRAL, in competition with Rochelle Salts or Potassium Tartrate and used in connection with *any* cyanide copper plating operation, offers the following:

- **SUPERIOR** Anode Corrosion, making maximum use of plating metal.
- **SUPERIOR** Solution tolerance to numerous metallic impurities such as Chromium, Calcium, Barium, Magnesium, etc.
- **SUPERIOR** Deposits with less tendency for roughness, caused by metallic impurities such as might be introduced with hard water.
- **SUPERIOR** Cost Savings when used at recommended concentration; where operating characteristics of standard and bright baths utilize Rochelle Salts at 6 oz./gal., SUPERTARTRAL offers 20% savings over Rochelle Salts and 23% saving over Potassium Tartrate.
- **SUPERIOR** Cyanide Stability... Lea-Ronal SUPERTARTRAL reduces cyanide breakdown with its resultant carbonate formation.

SUPERTARTRAL has been thoroughly and successfully *production* tested in still tank and barrel installations of conventional and bright cyanide copper processes, including the widely used Lea-Ronal Bright Copper Process.

LEA-RONAL Products are the result of careful research and development which guarantees that they are not put on the market until ready.

Don't you think that your constant search for improving plating operations and for lowering costs, warrants thorough investigation and trial of LEA-RONAL SUPERTARTRAL?

*Trade Mark Applied for
Patents and Patent Pending

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serving the Finishing Field
LEA-RONAL, INC.
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Lea-Michigan, Inc., Detroit
Lea Mfg. Co., of Canada, Toronto
Plating Polishing Buffing
Burring

Lea-Ronal Inc.
Main Office and Laboratory
42-46 27th Street, Long Island City 1, N. Y.
•
Manufacturing Plant
237 East Aurora Street, Waterbury 20, Conn.

For additional information Circle No. 83 on the Reader Service Card

Product Facts

Catalogs · Manuals · Brochures

PROCESSES

Investment Casting: 144
A new six page brochure has been published by the Cadmet Corp. which shows dozens of the parts cast in several different materials by Cadmet.

Powder Metal Parts: 145
A four-page brochure published by Powdercraft Corp. describes and illustrates many of the parts made by powder metallurgy. Included is a listing of self lubricating bushings and bearings made by the company.

Soft Metal Alloys: 146
"Cerro Alloys in the Pattern Shop" is the title of an eight page bulletin issued by Cerro de Pasco Corp. The bulletin describes the uses of the alloy in making accurate duplicates of wood patterns in the constsruction of aluminum matchplates.

Investment Cast Parts: 147
Precision Castparts Corp. have issued a four-page brochure describing their facilities and showing typical machine parts that are being made as investment castings.

Plastic Prototypes: 148
A folder from Precision Metalsmiths, Inc. describes the use of machined polystyrene patterns for investment casting as a means of making cast prototypes. Expensive tooling is avoided and proper alloy selection made through the application of this technique.

Investment Casting: 149
The Investment Casting Div. of Howard Foundry Co. has an eight-page brochure which describes and illustrates many investment cast parts. A partial listing of the castable alloys with their chemistry and mechanical properties is given.

Mold Release Agent: 150
A new mold release agent said to be particularly applicable to die casting is described in Bulletin R-2-53 issued by Vin-Rock, Inc.

Investment Casting: 151
A new 12-page illustrated booklet "Investment — For Economy — For Performance" has just been published by the Hitchiner Mfg. Co. The booklet traces the process from antiquity to modern industrial uses.

Die Castings: 152
A new brochure published by Precision Castings Co. shows the company facilities and castings being produced there. It also includes data for designers of die castings.

MATERIALS & EQUIPMENT

Hose Coupling: 160
A new quick connect-disconnect hose coupling for water, oil, steam, gas and chemical lines is described in a bulletin just published by Titeflex, Inc.

Core Plates & Slip Jackets: 161
Transite-Pellite is the title of a 4-page illustrated folder just issued by Johns-Manville on Transite core plates and slip jackets.

Carbide Grade Recommendations: 162
A three ring loose-leaf sheet giving the recommended grade of carbide for various operations with the corresponding grade designation of 9 manufacturers is available from Adamas Carbide Corp.

Brazing Compound: 163
Brazing of carbide tips to tool shanks is described and illustrated in a brochure from Handy & Harman. A grade of compound is recommended.

Flame Hardening: 164
The equipment for and the process of flame hardening are covered in a booklet published by The Cincinnati Milling Machine Co.

Fixtures Made of Plastic Material: 165
A moldable mixture of steel powder and plastic for use in making jigs, fixtures, etc. is described in a brochure from Chemical Development Corp.

Portable Band Saw: 166
A four-page brochure from Porter-Cable Machine Co. describes a new portable electric band saw for metal that has been developed.

Drilling & Tapping Units: 167
Commander Mfg. Co. have issued a new catalog covering their drilling and tapping heads, multiple spindle drill heads and other related equipment.

Hollow Die Steels: 168
A seven-page booklet has been issued by A. Milne & Co. listing their line of hollow tool and die steels. Sizes, properties and chemistry are covered.

Machine Deburring: 169
Nobur Mfg. Co. has published new information on deburring tools and their applications.

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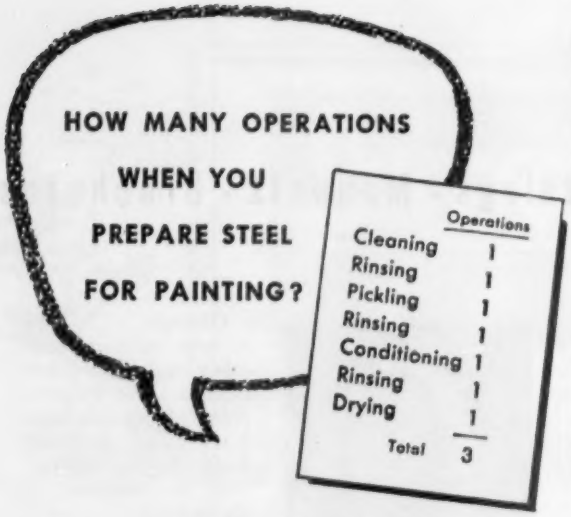
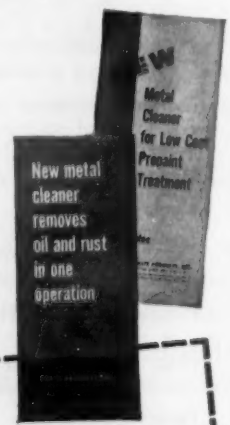


What's wrong with that addition? How can seven operation add up to three operations?

It's easy when you use Oakite Compound No. 33 (or Oakite Compound No. 31) to remove rust or heat scale *at the same time that* it removes oil *at the same time that* it prepares steel (or aluminum) for the lasting adhesion of paint.

That combines cleaning, pickling and paint conditioning into one operation. After rinsing and drying, you have saved the time, the tanks, the space and the solutions for four operations.

FREE For booklets describing the specific advantages and applications of Oakite Compounds Nos. 31 and 33, just mail the coupon.



Technical Service Representatives in Principal Cities of U. S. and Canada

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS • METHODS • SERVICE

OAKITE PRODUCTS, INC.
34G Rector St., New York 6, N. Y.

Send me your FREE booklets on Oakite Compound Nos. 31 and 33. I am especially interested in removing the following soils from ( ) steel, ( ) cast iron, ( ) sheet aluminum, ( ) aluminum castings:

☐ Oil and grease
☐ Drawing compounds
☐ Rust preventives
☐ Identification inks
☐ Carbon smut
☐ Paint
☐ Rust
☐ Heat scale
☐ Soldering flux
☐ Welding flux
☐ Tarnish
☐ _____

NAME _____

COMPANY _____

ADDRESS _____

For additional information Circle No. 84 on the Reader Service Card

PRODUCT FACTS — cont.

High Pressure Valves: 170
A set of loose-leaf data sheets on air and hydraulic valves, solenoid operated, is available from Beckett-Harcum Co.

Machining Hard Materials: 171
A new ultrasonic machine tool for cutting, drilling, slicing, trepanning and forming hard materials such as cemented carbides is described in a brochure available from Raytheon Mfg. Co.

FINISHING

Metal Cleaning Equipment: 175
In a seven page brochure, Metalwash Machinery Corp. describes the different equipment they produce and give typical uses of it.

Zinc Phosphate Coatings: 176
A new zinc phosphate coating material designed to be used in pressure-spray washing equipment has been developed by the Oakite Products, Inc. This coating and the older standard coating are described in two engineering service reports.

Flame Plating: 177
Linde Air Products Co. has developed a method of applying a coating of tungsten to wear surfaces. A 16-page booklet describes the process and its applications.

Polishing, Buffing, Grinding Equipment: 178
Catalogs No. 60 and 75 from Hammond Machinery Builders, Inc. fully describes that company's line of grinding, polishing, buffing and deburring machinery.

Alkaline Cleaner: 179
A brochure describing Composition 161 for cleaning of aluminum, steel and other metals is available from Oakite Products, Inc. The new cleaner is specifically for use in spray washing machines.

Abrasives and Grinding Wheels: 180
A 108 page handbook on abrasives and grinding wheels has been prepared by the Norton Co.

Barrel Finishing: 181
Techniques of barrel finishing and the use of Alundum abrasives in barrels are discussed in a new 53-page handbook recently released by the Norton Co.

Selenium Rectifiers: 182
An illustrated four page folder issued by United Chromium, Inc. describes their selenium rectifiers for plating and anodizing.

Protective Coatings for Zinc: 183
Allied Research Products, Inc. has available engineering data and test results on new finishing methods. Iridites No. 4-73 and No. 4-75 have been developed specifically for zinc die casting alloys.

Diamond Wheels: 184
Diamond impregnated wheels, both resinoid and metal bonded, are described and the available styles listed in a brochure available from Precision Diamond Tool Co.

Barrel Finishing: 185
A new barrel finishing machine has been introduced by Almco Supersheen. Known as model DB-50 the new machine is a compact model with all of the features of the larger Almco machines, but with intermediate capacity. A leaflet from the company describes it completely.

Conforming Matrix Expands Plant, Reorganizes Sales

Acquisition of space which will double the facilities of the manufacturing, engineering and executive departments of Conforming Matrix Corp., manufacturers of spray painting masks and automatic spray decorating machines, has been announced by H. E. MacArthur, president.

Included in the expansion program is a completely new machine manufacturing department. A large spray booth for the testing of machines under actual operating conditions has also been installed.

Concurrent with the announcement of plant expansion, MacArthur also issued a statement on the increase and realignment of the field sales force which will better enable the company to serve the needs of customers throughout America and Canada.

Milton T. Schimmel, who continues as sales manager and engineering consultant will supervise accounts in New England and Eastern states particularly, as well as direct all sales nationally.

Gerald D. Minnick, a native Chicagoan with an extensive background in tool engineering, will be in charge of the Midwestern states.

Jack M. Nims, an experienced paint technician, is in charge of the West Coast operations with office and warehouse at Arcadia, California. Mr. MacArthur will supervise the Mid Atlantic area.

A. M. McIntire, who comes to the organization with several years experience with one of the large automotive manufacturers, will be available for home office consultation.

E. L. Faber, who for the past three years has been production superintendent and chief engineer, has enlarged the designing and engineering development department.

For additional information Circle No. 29 on the Reader Service Card

or . . .

How To Get Precision Castings In Short Runs

Most draftsmen, being right-handed, require a drafting machine that puts the scale edge in proper relation to the right hand. Since the large chuck arm is the key to this relationship, it must be accurate and durable. The Universal Drafting Machine Corp., Cleveland, Ohio, therefore designed this precision component for its machine as a casting. Precision plus large quantity made it a natural for die casting. BUT . . . what about the relatively few demands for left-handed machines? Quantity was much too small to make die casting worthwhile. Hale engineers supplied the answer: cast the components for the left-handed machines in plaster molds.

Plaster mold casting offers high precision in non-ferrous parts at tooling costs not much higher than for sand castings.

If your requirements, like Universal Drafting Machine's, are for precision parts in limited quantities — or if you want pilot runs on components that will eventually be die cast — look to Hale Foundry Co. for fine plaster mold castings.

There is an equation with which you can determine the exact quantity level at which a part can most economically be cast in plaster molds. We'll be happy to show this equation to you. Just ask us.

For precision in limited production and pilot run parts, call on

HALE FOUNDRY CO.

1680 FALL ST. • CLEVELAND 13, OHIO

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Central offers complete modern facilities, strategically located which assures you of getting prompt dependable service on the best castings made.

CENTRAL SERVICES PROVIDE:

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- Wide range of quality aluminum and zinc alloys
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DIE CASTING and MFG. CO.

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For additional information Circle No. 21 on the Reader Service Card

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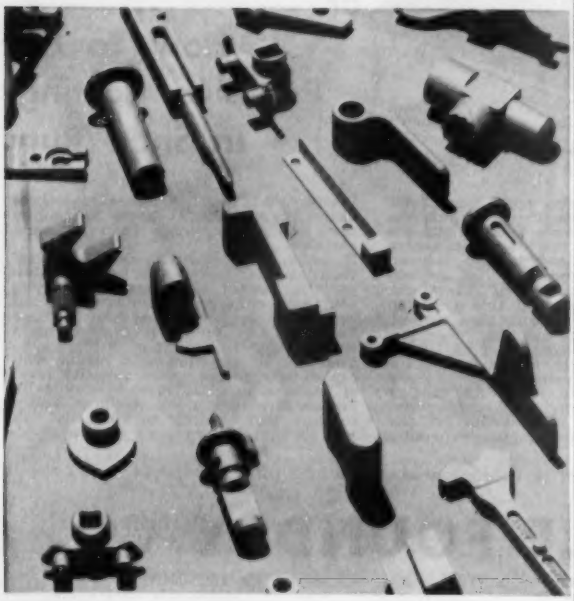

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Produced by **CANNON-MUSKEGON** for your particular application, **MASTERMET** Alloys match the needs of your melting operations. All variables are closely controlled.

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REFERENCE DATA FROM MPA SHOW
continued from page 34

METAL HYDRIDES, INC. — A brochure describing the company and its products. Data sheets on some of the company products are also available. No. 48

METALS DISINTEGRATING CO., INC. — The Drum, house organ of MD and literature on powders, pulverizers and dust collectors No. 49

NATIONAL CARBIDE DIE CO. — A four-page brochure on cemented carbide dies for powder metal. No. 122

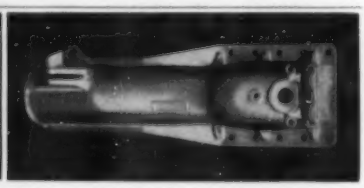
NEW JERSEY ZINC CO. — A 32-page booklet on brass powder and The Metal Powder Press, house organ on metal powders. No. 57

THE NATIONAL RADIATOR CO., PLASTIC METALS DIV. — A group of technical data sheets on the various powders made, a general bulletin on applications and an article on high density parts. No. 124

POW-MET INDUSTRIES, INC. — A four-page brochure describing high strength-high density powder parts being made. Physical properties dimensional control and surface finish are covered. No. 125

F. J. STOKES MACHINE CO. — Catalogs and bulletins on powdered metal presses. No. 126

YALE & TOWNE MFG. CO., POWDERED METAL PRODUCTS DIV. -- A brochure showing many of the parts being made and listing the physical properties of typical compacts. No. 73



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Produced by Specialists

Good design combined with well cast, economically produced aluminum permanent mold castings are the keys to volume sales and bigger profits . . . And our job here at Aluminum Permanent Mold is designing and producing better castings for outstanding manufacturers of American civilian and defense goods. Pictured above are a permanent mold oil pan die and casting and truck trailer leg bracket. For finer castings large or small call in an Aluminum Permanent Mold Engineer.

For Aluminum Permanent Mold and Sand Castings it's

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PERMANENT MOLD CO.
1054 Front Ave. • Grand Rapids, Michigan

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Simplified Solutions for product design problems

ABOUT 25 YEARS AGO, methods of "rearing" children began to change drastically with regard to freedom of self expression. One phase of this liberation was that normally left handed children were no longer deterred from being left handed.

In recent years, a leading manufacturer of drafting machines figured that the time was ripe for left handed draftsmen to begin appearing in reasonable numbers. This assumption has proven to be true, with the result that there is, today, a definite market for left handed drafting machines.

The standard model of this company's drafting machine has a die cast head, but since probable quantities of left handed machines is not great, cost of special dies could not be justified. To secure a precision casting, therefore, this manufacturer has turned to plaster mold casting as a method of fabricating the head for the left handed machines. This casting, produced by Hale Foundry, has a high degree of accuracy and good surface finish.

FINISHABILITY and close dimensional tolerances possible by powder metallurgy are illustrated in these two parts produced by Detroit Sintered Metals Corp. The fuse ring for a bomb, left, is cadmium plated, despite the inherent porosity of powdered metal parts. To accomplish this on a production basis, the pieces are first impregnated. The part on the right is an adjusting slide for a brake. Its unusual shape and close tolerances make milling from bar uneconomical, but all tolerances are held within close limits by powder metallurgy.

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RARE

but available

AT

ADVANCE

It takes EXPERIENCE as well as technical background to make Quality die castings. ADVANCE has thirty-three (33) years of die designing, die building and die casting experience under its belt to assure precision component parts that fit your product assemblies with minimum fuss, lower costs and on time.

That's why ADVANCE customers are both near and far. IT IS QUALITY THAT ATTRACTS ITS OWN.

Yes . . . some ADVANCE customers are over a thousand miles distant. After all, there can be no distance boundaries when experience and high quality die castings are needed.

33 years of service to industry

ADVANCE operates under the CERTIFIED ZINC PLAN of the American Die Casting Institute.

ADVANCE TOOL & DIE CASTING CO.
3760 N. Holton Street
Milwaukee 12, Wisconsin

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SKILL WILL DO IT
stainless steel
Ladles...
for die casting
give you these advantages

- easier pouring
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Because Spincraft ladles of stainless steel are so much lighter in weight, because they are so resistant to high temperatures, because they so positively lower costs in all directions, they are now in use in over 200 die casting plants everywhere—including the country's leading producers. Write today for an informative bulletin illustrating Spincraft's wide range of ladle sizes.

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For additional information Circle No. 69 on the Reader Service Card

HIGH TEMPERATURE CERAMICS STUDY OFFERED

An opportunity for teachers, research workers and development engineers to study applications of high-temperature ceramics will be offered during a two-week special summer program, from July 19 through July 30, at the Massachusetts Institute of Technology during its 1954 Summer Session.

"This special summer program," says Prof. Ernest H. Huntress, director of the M. I. T. Summer Session, "will deal with the application, development and properties of ceramic materials at high temperatures. Recent developments in techniques will be stressed."

The program is offered because of the increasing demands for ceramic materials for use at elevated temperatures for applications in nuclear energy, rockets, gas turbines, and metallurgical and chemical processes at high temperatures.

Dr. Frederick H. Norton, professor of ceramics, and Dr. W. D. Kingery, assistant professor of ceramics, will direct the program, assisted by other staff members in the M. I. T. Department of Metallurgy. Guest lectures will be:

W. R. Buessem, professor of ceramics at Pennsylvania State University: Wilhelm Eitel, director of Silicate Institute at the University of Toledo; L. H. Milligan, Norton Company; Eugene Ryskewitch, Kearfott Co., Inc., Karl Schwartzwalder, A. C. Spark Plug Div., General Motors Corp; Alan W. Searcy, assistant professor of chemistry at Purdue University.

Tuition for this special summer program in High-Temperature Ceramics will be $200; no academic credit will be given. Further details and application blanks may be obtained from the Summer Session Office, Room 7-103, M. I. T., Cambridge 39, Mass.

R. A. HASTINGS JOINS LINDBERG

R. A. (Buck) Hastings, formerly vice president of Continental Industrial Engineers, Inc., has become associated with Lindberg Engineering Co., as head of the sales department of a new division.

MICROPHONE POLE PIECES
continued from page 45

mensional accuracy that is required. There are no joints to affect the magnetic characteristics, scrap losses are nil and through control of the density of the part the proper field strength across the air gap is controlled. For this application, a high density part is used to secure maximum field strength, and this density is obtainable by the molding process.

These two cases, which are only a few of many, show how the relatively newer fabricating processes are helping the design engineer to put better products on the market at lower costs.

In other phases of microphone manufacture, other precision molding methods are

continued next page

EFFICIENT WAX MELTING EQUIPMENT

for your expendable patterns

available from STA-WARM

Sta-Warm offers you the RIGHT wax melter for your pattern production. Capacities range up to 100 gal. capacities. Large pre-melting tanks and smaller bench model pots are designed to fit your requirements. All are built to heat wax efficiently and hold it at workable temperatures so you can operate steadily without production delays.

Inquire today, outlining your needs.

Top—"WV" wax tank with close tolerance temperature control.

Bottom—"WV" wax pot, built in wide variety of sizes.

Sta-Warm ELECTRIC CO.

525 N. CHESTNUT ST. • RAVENNA, OHIO

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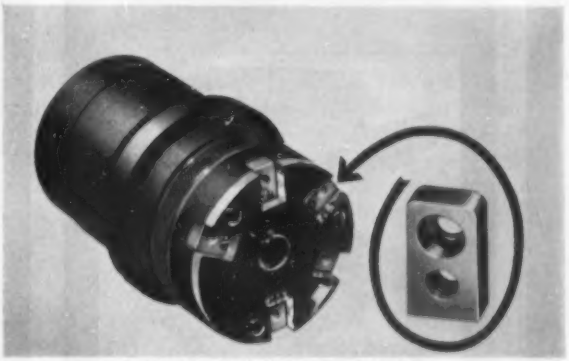
3 STEPS-NOT 6

NICKEL SILVER POWDER PARTS SAVE 84%



Five terminal clamps per assembly.

CASE HISTORY | No. 13

As now fabricated of nickel silver powder, only these three steps are required to produce the pictured terminal clamp: (1) pressing, (2) sintering, (3) tapping. High speed powder metallurgy production, combined with elimination of three operations, result in an 84% saving over machining from bar stock.

Formerly these six steps were involved: (1) cutting brass stock to length, (2) milling .281" dimension, (3) milling 5/32 in. thickness, (4) deburring, (5) drilling and tapping, (6) nickel plating to prevent discoloration.

23 ADDITIONAL CASE HISTORIES AND DATA ON DESIGN, PROPERTIES AND PRODUCTION

HERE!

SEND FOR YOUR COPY

THE NEW JERSEY ZINC COMPANY

160 Front Street New York 38, N. Y.

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aiding. For example, the case surrounding the instrument would seem to be simply a housing into which the important parts can be mounted. Having achieved this all that remains is to make the case as attractive as possible and at the same time inconspicuous, such a case is shown in Figure 3.

While those factors noted are important, even more important is to secure the correct acoustical configuration. In almost every instance, the case must be of metal and when properly designed from both an appearance performance standpoint, the resulting part might be prohibitively expensive to machine.

Because of the machining difficulties, only a casting process is practical for fabrication and the only methods of casting that can be used are either plaster mold casting during initial development and production when the quantities are small followed by die casting when larger numbers of cases are made. Both of these casting processes turn out cases that are substantially ready for assembly when delivered. Some few drilling and tapping operations may be necessary but that is all. Even surface finishing is much simpler since the as-cast surface is, in many cases, adequate with only minor buffing and polishing.

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PERMANENT MOLD

ALUMINUM CASTINGS

A FULL PERMANENT MOLD CASTING
Shown: Two views of a mounting ring for a hydromatic propeller governor.

Specialists in large, small, simple, and intricate permanent mold aluminum castings.

The techniques and skill developed through 30 years' experience assure you of the highest quality materials and workmanship obtainable.

We are specifically equipped to produce the ultimate in permanent mold aluminum castings for military or commercial products—and in any size or quantity.

Your inquiry will receive prompt attention!

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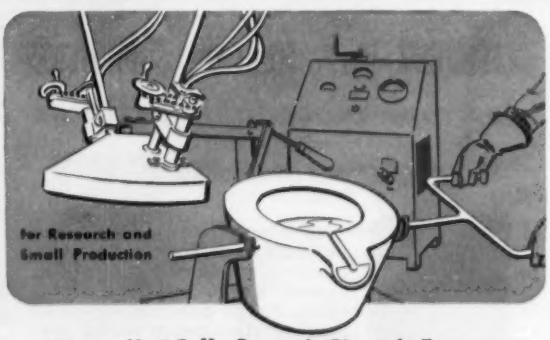

Versatile 15-lb. Detroit Electric Furnace

Compact 12 KW, 15-lb., Detroit Electric Furnace excels in a variety of research and small production jobs. Converging indirect arc electrodes in cover force arc down over metal for fast melting. Cover lifts and swings aside for easy charging and pouring. Pot can be transported as crucible or tilted to pour from stand. Insulated pot equipped with permanent lining or removable crucibles. Power unit and meters contained in one cabinet, require only simple wiring to electrodes.

Write today for complete information on Type PT Detroit Electric Furnace.

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Foreign Representatives: In BRAZIL—Equipamentos Industriais "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Casco, S. de R. L. Atenas 32, Despacho 14, Mexico City, D. F.

Circle No. 41 on the Reader Service Card

Industry News

Companies · Plants · Associations

GRIES RE-ORGANIZES SALES DIVISION HEADED BY JOSEPH SAKS; THREE NEW DEPARTMENTS FORMED

In line with their over-all expansion program, Gries Reproducer Corporation has reorganized its sales division in a move that establishes three new divisional departments, all to remain under the supervision of Joseph Saks, director of sales. The new set-up, according to an announcement by Otto Gries, president of the

Joseph Saks

firm, will answer the increased service demands of a rapidly-growing customer list, as well as result in greater sales effectiveness.

Named to the three new departments — sales, order and advertising — are: Carl L. Chase, as sales manager and Jack Maher as assistant sales manager and advertising manager. Peter White is manager of the order department, and Jack J. McDermott takes the post of sales department engineer. Edward L. Brancato assumes the duties of sales correspondent. All will work closely with Mr. Saks, who, as director of sales, heads the entire division.

The divisional re-organization reflects the recent physical expansion of the firm, which took possession of a new two-story brick and steel plant last August, upon its completion. The new building, a 100,000 square foot structure, has already resulted in an increase of personnel from 200 to 300. It is situated on a three-acre site that provides complete staff and visitor parking facilities.

The re-organization also reflects on the accomplishments of sales director Saks, Mr. Gries said. Mr. Saks has been an integral part of the Gries operation for 20 of the firm's 36 years, during which time Gries has gained national recognition for the design and manufacture of special machinery, tools, tiny plastic parts, small zinc die castings and die cast metal products, such as wing nuts, tubular rivets, cap nuts, gears and pinions, cup hooks and "intercast" multiple part units.

The Gries plant is located at 125 Beechwood Avenue, New Rochelle, N. Y.

BRITISH FIRM SETS UP NEW UNIT; SELLS DIE CAST MACHINES IN G. B. AND U. S.

In view of the considerable increase in demand for PECO pressure die casting machines, and machinery for the plastics and foundry industry, at home and overseas, and in their endeavour to increase their service to their customers, the Projectile & Engineering Company has formed a separate sales organization, "Peco Machinery Sales (Westminster) Ltd."

The offices of the new company are at 28, Victoria Street, London S. W. 1, England. (Telephone No. ABBey 1793 - 5). This organisation will handle all home and overseas sales of the parent company's machinery.

The sales company is a fully owned subsidiary of the parent company, and the Board of the new company consists of

A. J. Chambers

L. W. Lees

E. Gaspar

For additional information Circle No. 23 on the Reader Service Card

UCON
TRADE-MARK

hydrolubes . . .
don't ruin packings
and seals

You can use these safety hydraulic fluids in your present equipment without revamping. In fact, leakage is often lower than with regular hydraulic fluids.

To change over to UCON hydrolubes, drain the old fluid from the system, follow our recommended cleaning procedure, and refill—no need to change packings that are in good condition.

UCON hydrolubes contain water for non-flammability, and they *stay non-flammable* as long as the water concentration is maintained.

Switch to UCON hydrolubes now—for fire protection that counts.

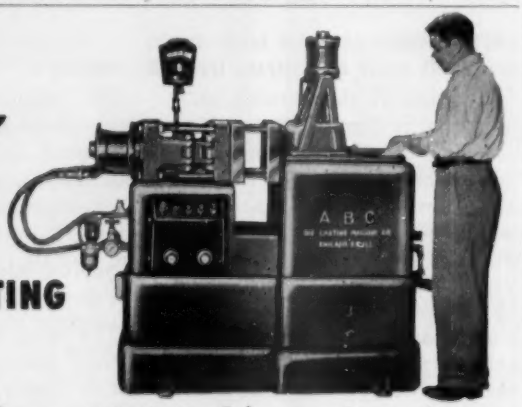
Write for the booklet, "UCON Hydrolubes," F-7380.

Carbide and Carbon Chemicals Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

"Ucon" is a registered trade-mark of Union Carbide and Carbon Corporation.

NEW!

HIGH SPEED
A.B.C. DIE CASTING
MACHINE



Free Cycles Over 1000 Shots Per Hour

Here's the new A·B·C high speed, low cost die casting machine which eliminates costly production of small die castings on large die casting machines. Air operated, the machine produces small non-porous lead, tin and zinc alloy precision die castings up to 1½ lbs.

The A·B·C is economical to operate and easy to set up. Its lightning production speeds makes single cavity molds practical and profitable.

STANDARD EQUIPMENT INCLUDES:
- 4 TIE BARS
- AUTOMATIC TIMING
- CALIBRATED TEMPERATURE GAS CONTROL
- GAS BURNERS
- DIE BLOCKS
- AIR REGULATOR
- FILTER
- OILER
- SAFETY SHOT INTERLOCK

Write today for engineering data and prices. Ask for bulletin A-10.

A B C
B

DIE CASTING MACHINE CO.
339 W. 112th PLACE · CHICAGO 28, ILLINOIS

For additional information Circle No. 1 on the Reader Service Card

A. J. Chambers, M. Freund, and E. Gaspar.

A. J. Chambers, who is the chairman of the new company, is also managing director of the Projectile & Engineering Company. He has been associated with this company for 35 years.

Mr. Gaspar is chief designer of the Projectile & Engineering Company.

L. R. Gent, secretary of the new Company, is also secretary of Projectile & Engineering. L. W. Lees, has been appointed sales manager of the new company.

MEET RODNEY . . .

. . . the cigarette-smoking mascot introduced to the powder metallurgy fraternity by Metals Disintegrating Company at their booth this Spring at the MPA Show.

Rodney, pride and joy of president Bud Hall of Metals Disintegrating, consumed tobacco at a rate to shame any chain-smoking mortal.

ANNOUNCES HIGH STRENGTH POWDERED METAL PARTS

A long step forward in the volume production of high strength powdered metal parts is announced by Keystone Carbon Co., St. Mary, Penn. This producer of powdered metal parts reveals that new alloy steel powders are now being molded into metal parts possessing physical characteristics heretofore available only in wrought steels.

The company states that the physical properties attained greatly exceed those found in

carburized iron or copper infiltrated iron compacts, and provide a material with strength and hardness sufficient to bridge the gap between conventional powdered metal compacts and solid materials.

Typical of these high strength alloy powders is the Grade Z-2, a high density alloy steel providing high physical characteristics.

When molded and heat treated, parts made of Grade Z-2 powder have an ultimate tensile strength of 115,000 lbs. per sq. in., with hardness of Rockwell C30.

OPPORTUNITIES

WANTED — Reed-Prentice die casting machine Model 3G with square tie-bars and 600 ton locking pressure. Write Box 6154, PRECISION METAL MOLDING magazine.

DIE CASTING DIE MAKER — to work for a well-known novelty manufacturer located in N. Y. City. Splendid opportunity for a first class man. Steady work and good pay. Salary open. State experience and age. Write Box 6254, PRECISION METAL MOLDING magazine.

SITUATION WANTED — College graduate, age 47, married. Experienced all phases of the die casting business. Eleven years as General Manager with large die casting company in the Detroit area. Resigned for personal reasons. Will relocate anywhere. Applications confidential. Write Box 6354, PRECISION METAL MOLDING magazine.

LONG ESTABLISHED MAJOR die casting company in suburban metropolitan New York area is expanding — offers excellent opportunity to experienced Tool and Die Estimator. Die Casting background preferred, plastics considered. Minimum experience 5 — 10 years, age 35 — 40 years. Will relocate qualified man. Write giving experience, salary requirements. Box 6454, PRECISION METAL MOLDING magazine.

SHELL MOLD CASTING
continued from page 41

The range in which patterns can be operated successfully and the corresponding temperatures for curing of shells must be closely controlled. It is felt that ideally the cure of the sand mixture should proceed from both faces of the shell toward the center at equal rates. To accomplish this there must be a definite relation between pattern temperature and curing temperature, otherwise over-curing on one side and under-curing on the other will be encountered.

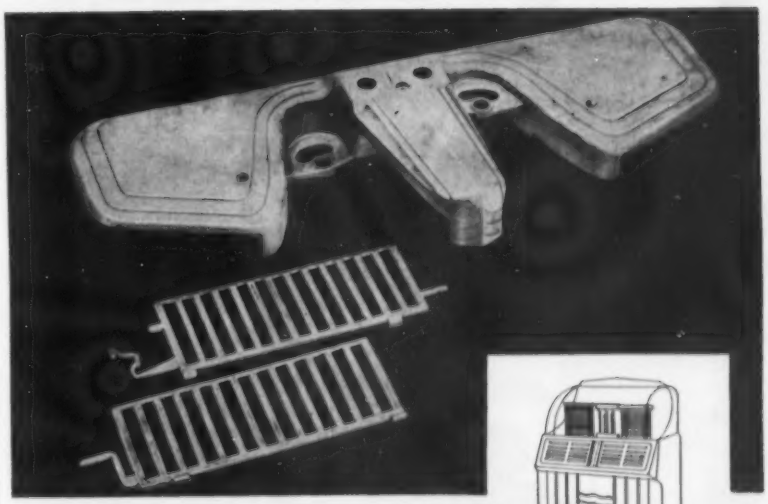
If curing is being accomplished by radiant heat in the 1100 to 1400F range, pattern temperatures as high as 600F are practical. A good working range would be 450 to 550F.

If curing is to be achieved in an oven at 800F a pattern temperature of less than 450F is recommended to avoid burning the pattern side of the shell by the time the shell is cured completely.

The success of satisfactory shell castings depends among other things, on the flatness of

continued next page

LIGHT, STRONG and LOW COST
ACCURATE Magnesium Die Castings



...save up to 40% in weight and are lower in cost than heavier metal castings

ACCURATES' magnesium die castings helped a leading manufacturer of coin operated phonographs to new production economies. Weight was reduced without sacrificing strength and at today's metal prices, castings were produced at a lower cost. Cast to close tolerances they require little or no machining . . . take a fine finish and cost less to handle all through production.

Accurate engineers will be happy to make unbiased-technically sound recommendations on the adopting of magnesium die casting to your products.

Here are 8 reasons why ACCURATE magnesium die castings are your best buy.

- Light Weight
- High Strength
- Low Cost
- Fine Surfaces
- Close Tolerances
- Uniformity
- Machinability
- Laboratory Controlled Quality

Major Producer of Aluminum, Zinc and Magnesium Die Castings

ACCURATE DIE CASTING CO.

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For additional information Circle No. 55 on the Reader Service Card

Precision Made... For Precision Performance

POWDERED METAL PARTS

precision made from exclusively formulated non-ferrous Sintroloy and Ductiloy are molded to close tolerances, thereby eliminating machining of intricate shape and high scrap loss.

Perhaps we may be able to help you solve specific parts problems. Get in touch with National Molded today for prompt attention.

Write today for detailed information and free literature on cost-saving standard bearings which are available from stock.

NATIONAL MOLDED PRODUCTS, INC.

1942 MILL ST. • ST. MARYS, PA.

It's a Certified Stainless Steel Melting BILL-ETTE for precision casting. No more costly, time-consuming cutting up of larger units: you choose from over 30 different alloys produced to exact product specifications . . . in the standard 1" x 1" x 3" or other sizes. Length can be ordered as required, at no extra cost.

BILL-ETTES bring a new convenience to precision investment casting. Certificate of Analysis and Heat Number with each shipment. Packed in 100 lb. kegs for ease of handling. Further metallurgical assistance yours on request. For specifications and prices on Certified Alloy Melting BILL-ETTES write to Metallurgical Division—

CHARLES DREIFUS CO.

Lincoln-Liberty Building, Phila. 7, Pa.

Serving the Steel Industry for Over 65 Years

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the shell at the joint. Some deviations from the flat, true surface are caused by variation in the rate of cooling of different portions of the newly ejected shell. Shell investing and curing conditions and sand resin mixes greatly affect the degree of plasticity of a shell at the time of ejection. If a very flexible or plastic shell is immediately placed face down on a flat surface for 10 to 15 seconds, it will tend to level out.

Pouring of shell molded castings is the same as that used in the pouring of conventional sand castings. Vertical pouring however is generally considered the best and this brings in a whole new set of variables which can generally be overcome with trial and patience, which foundrymen are suposed to have in abundance.

One fallacy seems to have

DIE CASTING DIES

FOR ZINC AND ALUMINUM

Complete engineering and tool room facilities for designing and building of die casting dies and plastic molds.

Highest standards of workmanship and skill go into the building of quality dies. Quality service a specialty.

Send your designs or samples for prompt quotation.

DAMEN TOOL and ENGINEERING Co.

• 2300 N. ELSTON AVENUE
• CHICAGO 14, ILLINOIS

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gained fast hold . . . that "shell castings do not have to be fed," this is far from the truth. Tipping a casting at 90 degrees may change the whole picture as far as directional solidification and hot spots are con-

OIL LUBRICATOR BRACKET: Shell molding saves 30 percent in weight over sand casting, 70 percent in machining operations, and gives superior surface finish. Hole centers are held within .005. The piece is also produced in shell molded malleable.

cerned. In general, yield is higher in shell molding due to less gating. However if there is a heavy section in the casting which will remain molten after the gates are solid, it must be taken care of by the use of risers, feeding, or chills

One of the principal causes of shell casting defects is the extremely smooth surface of the shell, as compared with the conventional sand mold. This permits the metal more or less to glide into the casting cavity without retarding, cleansing, or even combing effect of the sand mold surface. The shell castings may show evidence of dross or slag as a result of this condition. For these reasons it is necessary to add slag traps, basins, dirt catchers or strainers to avoid defective castings.

Shell pattern equipment generally costs more to produce than conventional sand cast patterns. This increased cost has been aggravated by casting accuracy requirements which in many cases are required in any well made pattern.

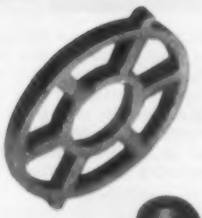
to be concluded next month

For additional information Circle No. 38 on the Reader Service Card

What Properties Do You Want In Your Iron Powder Parts?

STRENGTH . . .

. . . is the prime requisite for this meat-chopper cutting ring. Compacted from HVA electrolytic iron powder, its properties are: tensile strength—57,000 psi; yield strength —46,000 psi; elongation—15%.



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80. IMPROVED SURFACE FINISHING. Engineering data sheets are available from The Chemical Corp. giving pertinent information on their metal finishing processes and products.

82. BARREL FINISHING. A complete catalog of the products and descriptions of their uses can be secured from the Gravi-Flo Corp.

84. METAL CLEANING. Complete information is available on Oakite compounds No. 31 and 33, for metal cleaning of all sorts, from Oakite Products, Inc.

86. SURFACE FINISHING. Improvements in barrel techniques for surface finishing, deburring, etc. are described in the Roto-Finish circular.

20. DIE CASTING MACHINES. A complete catalog is now available from Cast-Master, Inc. listing all of the standard machines that company builds as well as attachments and extras for them.

28. TINY DIE CASTINGS. Information on the design and production of small die castings can be secured from the Gries Reproducer Corp.

36. METALLURGICAL DATA on all of the alloys that are available from the Charles Dreifus Co. for investment casting is now available.

39. HEAT EXCHANGERS for use on die casting machines can be secured from Kewanee-Ross Corp. in their Bulletin 1.1K5.

47. MATERIALS HANDLING, whether hot or cold, can be done with May-Fran Engineering, Inc. equipment. Their Bulletin MF-530 describes the different equipment available.

52. INVESTMENT BONDING AGENT. The applications of ethyl silicate as an investment bonding agent are fully described in literature from Monsanto Chemicals, Ltd.

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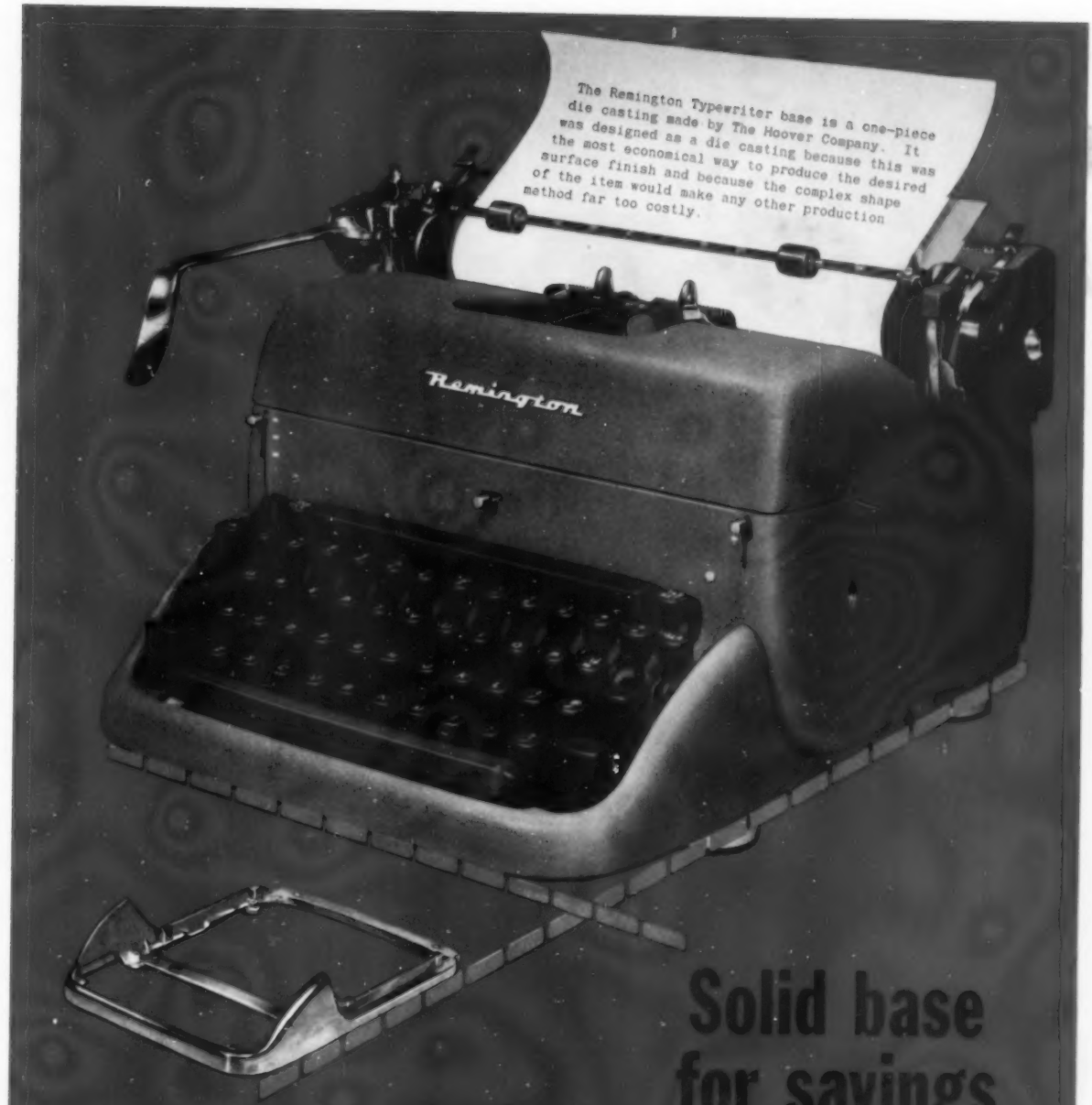
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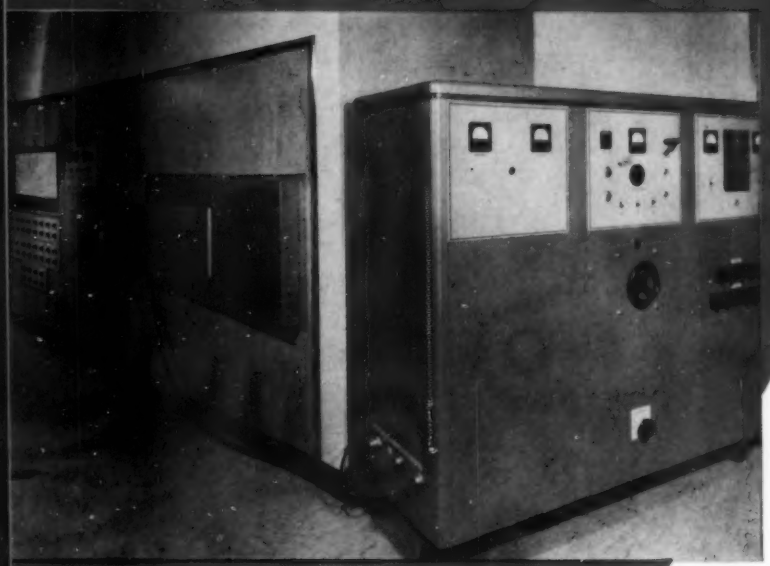

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